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97th Congress
2d Session } JOINT COMMITTEE PRINT

FISCAL YEAR 1983 ARMS CONTROL IMPACT STATEMENTS

Statements Submitted to the Congress by the President Pursuant to Section 36 of the Arms Control and Disarmament Act

MARCH 1982

Printed for the use of the Committees on Foreign Relations and Foreign Affairs of the Senate and the House of Representatives respectively

U.S. GOVERNMENT PRINTING OFFICE
89-844 O WASHINGTON : 1982

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

H382-5

S382-8

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FOREWORD

This document contains the fiscal year 1983 arms control impact statements (ACIS) as submitted to the Congress by the Reagan administration in compliance with section 36 of the Arms Control and Disarmament Act.

When Congress enacted this reporting requirement in 1975, it envisioned that the ACIS would enhance both executive branch and congressional decisionmaking regarding the potential impact of defense and nuclear programs on arms control policy and negotiations.

Submission by the Reagan administration of its first ACIS along with the fiscal year 1983 defense budget request, as required by law, is recognized and appreciated by Congress. This timely submission should make an important contribution to Congress' consideration of the Reagan administration's recently-announced strategic modernization program. Two of the major elements of this $180 billion nuclear modernization effort—the Trident submarine, and the MX missile—are analyzed in the fiscal year 1983 ACIS.

As part of the congressional consideration of the executive branch's fiscal year 1983 defense budget request, our committees will carefully scrutinize the quality of the corresponding ACIS to assure that they provide meaningful arms control analysis of major weapons programs as originally envisioned by Congress.

This year's joint committee print contains two additions, first included in last year's report, which have enhanced the utility of the ACIS for congressional use: a digest of the arms control impact statements prepared by the Congressional Research Service; and a glossary of pertinent terms and acronyms.

We believe that ACIS reinforces the importance of congressional and executive branch cooperation on matters of critical importance to our national security and thus look forward to continued compliance with the requirements of Public Law 95–338 in future years.

The views and analysis expressed in the following arms control impact statements are those of the executive branch and not necessarily those of the members of the Senate Committee on Foreign Relations or the House Committee on Foreign Affairs.

CHARLES H. PERCY,
Chairman, Committee on Foreign Relations.
CLEMENT J. ZABLOCKI,
Chairman, Committee on Foreign Affairs.

LETTER OF SUBMITTAL

U.S. Arms Control and Disarmament Agency,
Office of the Director,
Washington, D.C., February 8, 1982.

Hon. George Bush,
President, U.S. Senate.
Hon. Thomas P. O'Neill, Jr.,
Speaker of the House of Representatives.

Dear Mr. President: On behalf of the President, I am submitting the fiscal year 1983 arms control impact statements pursuant to 22 U.S.C. 2576, as amended. Classified and unclassified impact statements are submitted as required by the statute.[1] I am also submitting abbreviated statements for those programs that meet the statutory criteria for arms control impact statements but which have not received in-depth analysis for the reasons indicated.

The fiscal year 1983 budget cycle marks the seventh year in which arms control-impact statements have been submitted to the Congress. As in previous submissions, some statements describe alternative points of view about arms control effects. The inclusion of any particular viewpoint, therefore, should not be understood to imply its endorsement.

The programs described in the enclosed arms control impact statements are designed to strengthen our own and allied forces and to demonstrate to the Soviet Union that we are resolved to meet the challenge of their sustained and massive armament programs and their excessive reliance on military force and intimidation. These programs are essential to the development or maintenance of the United States military strength necessary to achieve a military balance with our principal adversary, to deter aggression, and to support and enhance international stability. The programs will permit us to pursue arms control objectives in a way which will enhance our security.

The Administration has concluded that all of the programs analyzed in the fiscal year 1983 budget are consistent with the terms and provisions of existing arms control agreements, with U.S. security and arms control policy, and with current negotiating poistions.

Sincerely yours,

Eugene V. Rostow.

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[1] The classified version is retained in committee files. This publication is the unclassified version in its entirety.

CONGRESSIONAL RESEARCH SERVICE—DIGEST OF FISCAL YEAR 1983 UNCLASSIFIED ARMS CONTROL IMPACT STATEMENTS[1]

INTRODUCTION

The arms control impact statements (ACIS) for fiscal year 1983 consist of 11 in-depth documents and two compilations of abbreviated ACIS. Each in-depth ACIS is organized into six sections: (1) Introduction; (2) program description; (3) stated military requirements; (4) funding; (5) analysis; and (6) summary and overall arms control assessment. The following digests are based on the introduction, analysis, and summary sections of each ACIS and were prepared from the unclassified versions provided to the Congress by the Administration on February 8, 1982. These digests represent restatements of the language of each ACIS and do not necessarily reflect the views of the Congressional Research Service. Additional information beyond the scope of these digests is available in the unclassified ACIS published in this volume. The most complete information, especially for the ACIS on space defense programs and others that are largely deleted in the unclassified version, is available in the classified ACIS.

ICBM PROGRAMS

Maintaining and improving the capabilities of the U.S. land-based ICBM force—one of the three components of the U.S. Triad of strategic nuclear offensive forces—are necessary for deterrence, to redress an asymmetry in ICBM capabilities favoring the Soviet Union, and to maintain a balance in overall strategic forces. The decision to build the MX missile and to continue upgrading the Minuteman force takes account of the following arms control implications:

—Deployment of the MX and modifications to the Minuteman are consistent with the terms of SALT I and II, which allow modifications of existing weapons systems within specific constraints. The SALT II agreement permits deployment of one new type ICBM.

—Failure to deploy MX could lead to perceptions of Soviet advantage with the following political implications: greater Soviet freedom of action in employment of conventional forces and in the implicit use of nuclear strength for political coercion; changing perceptions of the U.S.-U.S.S.R. military balance among third countries, thus affecting U.S. foreign policy; and a decrease in Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe.

—All MX deployment options under consideration address the problem of perceived vulnerability. The existence of survivable, secure U.S. retaliatory capabilities will enhance strategic stability.

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[1] Prepared by Dagnija A. Sterste-Perkins, Analyst in International Relations, Foreign Affairs and National Defense Division, Congressional Research Service.

- —Soviet perceptions of the effect of MX on the vulnerability of their overall strategic forces will determine MX's effect on stability; Soviet reliance on silo-based ICBMs for strategic warhead deployment could affect their judgment about MX. If they recognize that the U.S. program emphasizes retaliatory capability, they should find opportunities for enhancing their security through arms control.
- —Deployment of mobile ICBMs—particularly a Soviet mobile ICBM—could raise verification problems for both sides. Ground-mobile schemes would require cooperative measures for adequate verification. Negotiated agreement could also help overcome these difficulties for both powers.
- —Despite U.S. policy regarding START and INF arms control negotiations, many nonaligned nations criticize intensification of the U.S.-U.S.S.R. nuclear arms race on the basis of article VI of the NPT. Progress on START or in INF talks would help mitigate criticisms as well as an eventual weakening of the NPT as a preventor of nuclear weapons spread. Many important non-nuclear weapon states are U.S. allies that rely on the U.S. nuclear arms umbrella and regard modernization as essential; thus, from their viewpoint, U.S. modernization inhibits proliferation.
- —A viable ABM defense of U.S. ICBMs could improve survivability and is under study. Adopting an ABM defense of the MX could require amending the ABM Treaty or withdrawing from it. On the other hand, the U.S. R. & D. program could reinforce the ABM Treaty by discouraging evasion or abrogation. Soviet ABM deployment would be economically and militarily unsound because U.S. advanced technology provides disincentives for Soviet upgrading or deployment of an ABM system around Moscow or elsewhere by reducing its potential effectiveness in preventing the arrival of ballistic missile re-entry vehicles.

SSBN/SLBN PROGRAMS

The Trident submarine, missile, and warhead programs will provide a new class of fleet ballistic missile submarines (SSBNs) and SLBMs to augment and eventually replace the present Polaris and Poseidon strategic submarines. They have the peacetime mission of deterrence of nuclear war, and the wartime missions of strategic and theater nuclear strikes, as well as deterrence of further escalation. Arms control considerations include the following:

- —As U.S. silo-based ICBMs become more vulnerable, SSBNs could become more important in guaranteeing U.S. retaliatory capability and thus help to insure strategic stability.
- —Because of the greater range of Trident missiles, U.S. strategic submarines have many times more available ocean operating area. Also, the improved speed and low operational noise of Trident submarines make them even more survivable against Soviet ASW then are existing SSBNs, which are already highly survivable. No pending Soviet ASW developments are likely to pose a significant threat to Trident.

—Trident missile programs could be constrained by the terms of the Threshold Test Ban Treaty, which limits the United States and the U.S.S.R. to nuclear tests of no more than 150 kilotons.

—The increased operating room afforded by the Indian Ocean might be of future use to U.S. SSBN/SLBM forces. If a major Soviet ASW breakthrough were to imperil the U.S. ballistic missile submarine force or if the Soviets were to abrogate the ABM Treaty and make major new efforts to build ABMs, the United States might require Indian Ocean launch points to complicate Soviet defenses. Any serious consideration of the Indian Ocean as a "Zone of Peace" or a "Nuclear Free Zone" must consider this potentiality.

—Deployment of Trident II missiles would complement other programs designed to compensate for U.S. fixed ICBM vulnerability and would provide a hedge against possible vulnerability of the other legs of the strategic Triad through the 1990's. Trident II's survivability would enhance crisis stability because it would contribute to an enduring retaliatory force that could inflict damage across the spectrum of Soviet targets.

—Deployment of Trident II could add incentives for the Soviets to reduce their ICBM vulnerability by deploying more ICBMs at sea or in a mobile basing mode; this might enhance strategic and crisis stability. The Soviet response would depend on the speed of U.S. deployment, the cost of changes to the Soviets, and the perceived degree of threat to their silo-based ICBMs.

—SSBN/SLBM programs will not cause verification problems; numbers can be monitored by national technical means.

AIRBORNE STRATEGIC OFFENSIVE SYSTEMS

Modernization of the B–52, procurement of the B–1B, deployment of air-launched cruise missiles and development of advanced aircraft technologies will contribute to the continued viability of the bomber element of the strategic Triad.

—Development of cruise missiles, particularly ALCMs, will give the U.S. leverage in future START negotiations. The possibility of a major increase in U.S. strategic capabilities in the absence of SALT reductions, as suggested by cruise missiles and related force improvement programs, could enhance the chances for a balanced and verifiable agreement.

—B–52 avionics system upgrading, ALCM deployment, and B–1B procurement will maintain U.S. airborne strategic offensive effectiveness in the face of improving Soviet air defenses. These systems do not represent a first-strike threat against the Soviets, but their retaliatory capability enhances deterrence and contributes to strategic and crisis stability.

—U.S. ALCM deployment could lead the Soviets to respond by (1) increasing efforts to deploy a defense against cruise missiles and their associated launch platforms; (2) accelerating their development of a cruise missile capability; (3) upgrading their overall existing strategic offensive systems. But Soviet long-range cruise missile development would more likely be in response to Soviet military requirements than in reaction to U.S. ALCM deployment.

—Cruise missiles present troublesome verification problems; future arms control agreements will require more detailed and stringent cooperative measures to ensure adequate verification. In contrast with U.S. efforts to monitor Soviet cruise missile programs, the open U.S. society affords the Soviets considerable advantages in monitoring U.S. programs. The problem of verifying compliance with limits on ALCM carriers, however, is not insurmountable.

—Without offsetting adjustments in U.S. forces, a U.S. decision unilaterally to restrict cruise missile deployment and new bomber procurement would lead to U.S. strategic forces that were not capable of supporting U.S. national security objectives.

SPACE DEFENSE

The Space Defense System program is developing alternative methods of destroying objects in space. The effort involves four functional areas: (1) anti-satellite systems; (2) space systems survivability; (3) space surveillance systems; and (4) command and control. Because the Soviets currently possess an operational ASAT and the United States does not, arms control policy with regard to space defense is under review.

The U.S. space defense program indicates U.S. determination not to permit a Soviet ASAT monopoly; is subject to revision depending on decisions regarding ASAT negotiations; is consistent with U.S. obligations under the Outer Space Treaty, the U.N. Charter, the ABM Treaty, the International Telecommunications Convention, the Convention on Registration of Objects Launched into Outer Space, and the Direct Communications Link Modernization Agreement; will not adversely affect other arms control negotiations; and is not likely to lead to third-country development of antisatellite systems.

BALLISTIC MISSILE DEFENSE

The U.S. ballistic missile defense (BMD) research and development program is conducted within the terms of the ABM Treaty and supports U.S. arms control policy by keeping the United States abreast of BMD technologies, thereby hedging against and serving to discourage any possible Soviet breakout from the ABM Treaty. BMD research will provide the technological base from which a system to defend ICBM sites could be developed to support a Presidential decision on deployment. A deployment decision could convince a potential attacker of the pointlessness of any offensive buildup designed to produce a disarming first-strike capability against ICBMs. But ABM deployments could also stimulate an offense-defense competition, including the development and deployment of advanced penetration aids and maneuvering reentry vehicles for offensive forces, as well as increases in force levels, giving each side an incentive to further improve the capabilities of its ABM systems.

By making possible greater confidence in our understanding of the potential of BMD technologies, this program supports continued U.S. adherence to the ABM Treaty, or, if necessary, helps identify those technologies and systems for which a Treaty amendment might be appropriate. The ABM Treaty is scheduled for review and a U.S.-U.S.S.R. meeting will be held for this purpose sometime after October 3, 1982.

INTERMEDIATE-RANGE NUCLEAR MISSILE SYSTEMS AND THE SEA-LAUNCHED CRUISE MISSILE

The term "Intermediate-Range Nuclear Forces" (INF) was introduced as the United States prepared to begin negotiations with the Soviet Union in November 1981. The systems involved are the Pershing II (PII) and the ground-launched cruise missile (GLCM). The previous term, "Long-Range Theater Nuclear Forces," was changed to more clearly reflect the scope of the U.S.-U.S.S.R. negotiations and to dispel the idea that the United States viewed Europe as a "theater" of nuclear conflict distinct from the United States. There have been no significant programmatic changes in either the PII or the GLCM programs since submission of the fiscal year 1982 ACIS. The fiscal year 1983 discussion was included because of the high level of interest in INF.

The land-attack, sea-launched cruise missile (SLCM) will be deployed on ships and submarines to expand and strengthen U.S. worldwide sea-based forces. The physical similarities between SLCM and GLCM raise a number of related arms control issues.

—In the absence of international agreements to reduce nuclear stockpiles, there is a need to retain and modernize theater nuclear capabilities, especially those such as PII and GLCM which support NATO's strategy of flexible response. The availability of a graduated escalatory ladder enhances deterrence by raising the possibility that aggression at any one level of conflict might either be matched in kind or escalated. Deployments of PII and GLCM add a new dimension to the variety of response options below the strategic level. This helps to insure the linkage between lower response options and the strategic nuclear forces and in so doing makes an effective NATO response more credible.

—The positive effect of U.S. and NATO modernization programs on arms control negotiations has already been demonstrated in the INF talks. In the face of Allied resolve to proceed with INF deployments, the Soviets dropped their preconditions for entering into negotiations.

—The increased survivability of PII, GLCM and SLCM might allow the West to put relatively less dependence on aircraft for the delivery of nuclear weapons, thereby releasing some aircraft for conventional roles. Such increased conventional capability could aid in raising the nuclear threshold, and at the same time improve survivability and stability.

—INF modernization is directed toward lessening perceptions of gaps in the continuum of NATO capabilities and to enhance deterrence, Alliance cohesion, and stability. While there has been agreement on the need to improve INF to counter Soviet gains, there is also some resistance among the Allies to increasing NATO's INF capability owing to the fear that a Euro-strategic balance may be created which would decouple NATO nuclear forces from U.S. strategic forces.

—Development and deployment of warheads for INF missiles and SLCM would not be affected by the Limited Test Ban Treaty; the terms of the Threshold Test Ban Treaty limit the United States and the Soviet Union to nuclear tests of no more than 150 KT of explosive yield.

—With respect to future arms control agreements, mobile systems such as the Soviet SS–20 and GLCM are likely to present difficulties for verification.

—Like any nuclear modernization program, the PII, GLCM, and SLCM programs entail political costs and carry with them important arms control implications. The United States will continue to ensure that these programs are consistent with overall national security objectives, including the development of future options for limiting strategic and theater nuclear arms to ensure deterrence and global stability.

SHORT-RANGE NUCLEAR FORCES

Dual-capable artillery and short-range missiles, the low end of the spectrum of U.S. nuclear weapons, are an important component of NATO's military forces and deterrent posture. They support NATO's doctrine of flexible response which suggests the possibility that a conflict in Europe could be escalated in a controlled way to seek its termination. Because they are likely to be involved in war at an early stage, their deployment raises concerns which have become more prominent as a result of the controversy surrounding the reduced blast/enhanced radiation (RB/ER) feature of certain new warheads being produced for U.S. short-range nuclear systems.

—President Reagan announced on August 6, 1981, that ER weapons would be produced and stockpiled on U.S. territory. There are no plans to deploy ER weapons outside of U.S. territory.

—Effective implementation of NATO doctrine in a manner consistent with announced strategy contributes to stability in Europe, an arms control objective. Modernization of these warheads is also consistent with arms control goals in that range, accuracy, control, and security improvements represent evolutionary changes in existing weapons and are unlikely to affect significantly existing perceptions of these weapons or their relationship to U.S. arms control efforts.

—Front line deployment of these systems has caused concern because the Warsaw Pact could be tempted to attack with its own nuclear systems. However, a Soviet strike probably would be initiated upon indication that NATO intended to use nuclear weapons. If necessary a Soviet strike could be launched to achieve Soviet objectives and would target known nuclear storage sites and deployments, not just LANCE or dual-capable artillery.

—The United States is not party to any treaty or other legal obligation that would inhibit the development, production or deployment of short-range nuclear weapons. Development of these weapons is not affected by the provisions of the Threshold Test Ban Treaty.

—Failure to modernize short-range nuclear weapons could indicate to Europe a lack of U.S. resolve to use nuclear weapons, if necessary, for Europe's defense. This could weaken European incentives to strengthen conventional forces or cause them to strike on their own, if they believed that the ultimate deterrent was not credible. These modernization programs thus may be seen as demonstrating U.S. commitment, encouraging the strengthening of conventional forces, and therefore raising the nuclear threshold.

FLEET AIR DEFENSE SYSTEMS

STANDARD missiles are ship-launched surface-to-air missiles (SAM) intended for surface combatant defense against air-breathing threats. Improvements, such as stand-off jammer suppression, vertical launching systems, and nuclear warheads, are intended to counter new, more capable air-breathing threats to warships. Upgrading conventional fleet air defense capabilities would reduce the prospective vulnerability of fleet battle groups operating in the projected combined Soviet air, sea, and subsurface severe threat environment. By improving the U.S. Navy's capability to perform a variety of vital missions in peacetime and in war, they contribute to the deterrence of war and to international stability, hence furthering arms control objectives.

—The United States is not a party to any arms control agreement which restricts deployment of naval anti-air warfare weapons or their supporting systems. Article VI of the ABM Treaty contains a provision, included at U.S. insistence, which prohibits giving non-ABM missiles, launchers, or radar an ABM capability; the negotiating record sets forth a list of indicators for judging whether a SAM system has an ABM capability, including phased-array radar and nuclear-armed interceptors. The programs discussed in this ACIS include the first U.S. mating of a non-ABM nuclear interceptor with a phased-array radar system. The Soviets have already deployed SAMs with phased-array radars. It is in the U.S. interest for both parties to the ABM Treaty to avoid steps making verification more difficult. It is difficult to differentiate among systems intended for defense against air-breathing, tactical ballistic missiles, or strategic ballistic missile threats. To constrain U.S. programs without firm categorization criteria could result in the United States being more self-constrained than the Soviet Union in developing high performance air defense systems.

—U.S. naval forces that were only equipped with conventional defenses would present more vulnerable targets for air-launched Soviet attacks. The possibility of a U.S. nuclear response could increase Soviet incentives to exercise forbearance in the use of nuclear weapons against U.S. naval forces. Whether the use of nuclear weapons over an ocean area would lead directly to escalating the associated land campaign is unknown.

MEDIUM-RANGE AIR-TO-SURFACE MISSILE

The medium-range air-to-surface missile (MRASM) is a conventionally armed, tactical cruise missile for both anti-ship and land-attack employment. The MRASM would provide an improved conventional capability to disrupt such activities as airfield operations, to contribute toward the creation of maritime superiority required to put Soviet naval forces at risk, and to project forces worldwide. By enhancing NATO's conventional posture and U.S. capabilities worldwide, they support deterrence and regional stability.

—SALT II limitations would have pertained only to air-launched cruise missiles with fuel exhaustion ranges of over 600 km;

MRASM would not have been considered a long-range cruise missile under SALT II terms. SALT II also would have required externally observable design features to distinguish MRASMs from long-range cruise missiles; this requirement is also met by the systems under discussion. Because MRASM is medium range and conventionally armed, it should not be subject to limitation in future strategic systems negotiations. If negotiated cruise missile constraints were more severe, future arms control agreements could require more encompassing and stringent cooperative measures in order to assure adequate verification.

CHEMICAL WARFARE

The proposed fiscal year 1983 chemical warfare (CW) program includes active RDT&E of both deterrent retaliatory and defensive CW programs; procurement of an improved protective CW capability; initiation of actions needed to modernize the U.S. deterrent retaliatory capability and to dispose of the deteriorating chemical agent stockpile; and maintenance of chemical munitions. The program supports the U.S. objective of maintaining an adequate defensive and deterrent retaliatory capability, increasing the safety of the systems involved, as well as eventually concluding a complete and verifiable prohibition of chemical weapons production, development and stockpiling; and contributes to negotiations by allowing the United States to gain negotiating leverage in the area of chemical weapons arms control.

—The U.S. CW program is fully consistent with, and complementary to, the pursuit of a CW ban and the U.S. policy of no first use of chemical weapons.

—Congressional and Administration actions to construct and to equip Phase I of a binary CW production facility do not represent a decision to place greater emphasis upon CW but reflect U.S. national security policy to deter war.

—Bilateral U.S.-U.S.S.R. negotiations on a comprehensive CW prohibition stalled in 1979 over verification issues; since then, multilateral interest in CW discussions has intensified within the Committee on Disarmament.

—The Soviet Union can easily verify that the United States is actually conducting the CW programs which we openly claim.

—U.S. policy is to pursue chemical weapons arms control and to maintain appropriate military capabilities to eliminate the existing large asymmetry in U.S.-U.S.S.R. CW capabilities, until such time as effective international agreements remove existing and future threats of CW.

DIRECTED ENERGY PROGRAMS

U.S. directed energy (DE) programs represent an effort to explore and, if feasibility is proven, to develop the potential of DE weapons, which would have potential mission advantages over many existing types of weapons against missiles, aircraft and spacecraft targets. While high energy lasers (HEL) and particle beams (PB) differ in state of development and in the technology required to realize them, they have potential for weapon systems of similar operational characteristics. Further, they could have similar implications for the future of the ABM Treaty, possible ASAT negotiations, and space defense issues generally.

—Research conducted to stay abreast of technologies having military potential and to gain insight into what the Soviets and others may be discovering through their own research helps provide confidence that the United States can maintain an adequate balance of forces.

—DE weapons research is not constrained by existing arms control agreements. The ABM Treaty bans the development, testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. Although the Treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams), including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the Treaty prohibits their deployment unless the Parties consult and amend the Treaty.

—DE weapons in an ASAT role are affected by the ABM Treaty, SALT I, and SALT II. These agreements prohibit the actual use of systems to interfere with national technical means used to verify compliance with strategic arms control agreements. They do not prohibit the development, testing, or deployment of systems that could be used in such roles.

—New technologies like HEL weapons could serve arms control interests by encouraging nations to negotiate with one another in an attempt to avoid waging and possibly losing an expensive weapons race. It is not possible to make a reasonable assessment of the net impact of the HEL program on future global or regional stability.

—Although the DE-related R. & D. efforts funded in the fiscal year 1983 budget have no more than marginal arms control effects now, this technology deserves continuing attention in the future.

ABBREVIATED ARMS CONTROL IMPACT STATEMENTS

As in the fiscal year 1982 ACIS, the fiscal year 1983 submission contains two sets of abbreviated ACIS: One for Department of Defense programs and one for Department of Energy programs.

The abbreviated DOD ACIS contains two sections. Section I, listing programs for which ACIS were previously submitted, includes Anti-Ship Missile Systems, Large Area Ocean Surveillance Systems, Strategic Warning and Attack Assessment, Advanced Isotope Separation and Centrifuge Enrichment, and NAVSTAR Global Positioning System. While these programs have continuing arms control implications, they have had no significant changes in funding, program direction, policy, or international developments that would revise the Administration's analysis forwarded in early 1981. The need for updated ACIS will be reevaluated as these programs evolve.

Section II includes other programs which meet congressional criteria for ACIS but for which in-depth ACIS were not prepared. For each program, a brief description is given along with its program element number and R–1 or P–1 report page and line number, as applicable.

Activities within these programs are primarily associated with one or more of the following:

—Programs in too early an exploratory research and development stage to determine with precision their possible arms control implications.

—Programs providing continuing normal support for existing missions or deployed operational systems and organizations.

—Production and procurement of a developed weapon system; nonnuclear munitions, cartridges, projectiles, rockets, etc., and associated equipment; spares and repair parts; associated electronic, communications, training and support equipment; support, storage, industrial and test facilities construction and operations; utility and specialized vehicles, ships, tanks, and aircraft; miscellaneous production charges, first destination charges and outfitting costs. In themselves, none of the activities in this category is judged to have a significant impact on arms control policy or negotiations.

—Modification or modernization of an already procured system which does not significantly alter the characteristics of the system from an arms control standpoint.

—Programs which were analyzed as in-depth statements in previous years and found to have little, if any, additional arms control impact.

—Programs involving miscellaneous research, development, testing, and evaluation of programs not otherwise categorized, which are judged to have marginal, if any, impact on arms control policy or negotiations.

The abbreviated ACIS for the Department of Energy programs list those activities related predominantly to normal maintenance and reliability assessment of the nuclear stockpile. Because they do not provide for additional warheads/bombs or for significant changes in characteristics or deployments, none of them is judged to have a significant impact on arms control policy or negotiations. The ACIS lists 24 different nuclear warheads and gravity bombs, with a brief statement about the weapons systems for which they were developed.

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PART I: ARMS CONTROL IMPACT STATEMENTS SUBMITTED BY THE ADMINISTRATION

ICBM PROGRAMS

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11212F	TITAN Squadrons
11213F	MINUTEMAN Squadrons
Procurement	MINUTEMAN II/III
Procurement	ICBM C^3 Integration
DOE Program	W78 Warhead
64312F/11215F	MX
Procurement	Advanced ICBM (MX)
DOE	WXX MX Warhead
63311F	Advanced Strategic Missile Systems (ASMS)*

---

* Includes the Former Advanced Ballistic Reentry System (ABRES) program.

All of these programs are directly related to maintaining or improving the capabilities of the US land-based ICBM force. As such, the arms control implications of these programs are best analyzed in a single impact statement.

II. PROGRAM DESCRIPTIONS

The US ICBM force is one of the three components of the US Triad of strategic nuclear offensive forces. The ICBM operational force is currently composed of 550 MINUTEMAN III (MM III) ICBMs, each with up to three multiple independently targetable reentry vehicles (MIRVs), 450 single warhead MINUTEMAN II (MM II) ICBMs, and 52 single warhead TITAN II ICBMs. These 1052 operational missiles will carry up to 2152 warheads of various yields and accuracies.

A. TITAN Squadrons Program (PE 11212F).

TITAN II wings are located at Davis Monthan AFB, Arizona, McConnell AFB, Kansas, and Little Rock AFB, Arkansas. The missiles are dispersed in hardened underground launch complexes. The TITAN II weapon system achieved full operational capability in December 1963. The President has recently directed that all TITAN missiles be deactivated as soon as possible. [Deleted].

B. MINUTEMAN Squadrons Program (PE 11213F).

The MINUTEMAN force is deployed in hardened and dispersed underground silos. The missiles are controlled by combat crews from hardened underground launch control centers. A number of improvements have recently been made or are being made in MINUTEMAN systems:

1. Survivability: The Silo Upgrade Program provides improved protection to the missile launch facilities from blast and shock, radiation, and electromagnetic pulse. Modification of all launch facilities was completed in January 1980.

2. Accuracy: The Guidance Improvement Program developed an improved computer software program for the MM III NS-20 Missile Guidance Set. The improved software has been deployed on all 550 MM III missiles and is predicted to improve operational accuracy. However, a high confidence estimate of the improvement will not be available until a sufficient number of operational test missiles have been launched.

3. Improved RV: The MK-12A reentry vehicle is being acquired to replace the MK-12 RV on 300 of the 550 MM III missiles currently deployed. Initial operational capability (IOC) was achieved in FY 1980. Deployment of the MK-12A on the 300 MM III missiles is scheduled to be completed in FY [deleted]. Current plans do not call for the MK-12A to be deployed on the remaining 250 MM III missiles.

The MK-12A RV was designed to be employed against the total spectrum of targets but increasingly has been planned for employment against a growing Soviet hardened target system, where its combination of yield and accuracy could be used to military advantage. Although the MM III in its current configuration is effective to some degree against hard targets, improved accuracies which may accrue as a result of the guidance improvement program and the higher yield of the MK-12A (W78) warhead would increase this capability.

4. Command, Control and Communications (C^3):

Three new or improved command, control, and communications systems are planned to be incorporated into MINUTEMAN launch control centers to improve existing communication links with higher command authorities: the Air Force Satellite Communications System (AFSATCOM); the 616A Survivable Low Frequency Communication System (SLFCS); and the Strategic Air Command Digital Network (SACDIN). These systems would reduce the transmission, receipt, and processing time for emergency action messages as well as the crew workload during time-urgent situations.

C. Procurement -- MINUTEMAN II/III and ICBM C^3 Integration.

Procurement of MINUTEMAN ICBMs and modifications to them are funded under four separate line items. Prior to FY 1981, a total of $12.8 billion was appropriated for procurement of MINUTEMAN ICBMs, associated research and development, and military construction. [Deleted]. In FY 1982, $110.7 million was requested for MM II/III improvements [deleted]. These funds completed procurement of the MK-12A reentry vehicle for the MM III. Final funding for ICBM C^3 integration is programmed in FY 1984. There are no funds requested for further MK-12A procurement.

Procurement funds are also requested for Class IV modifications of MM II/III missiles to improve reliability, enhance performance and increase maintainability. $59.6 million was provided for these purposes in FY 1982 and $93.2 million is programmed for FY 1983.

D. W78 Warhead Program (DOE).

Development engineering of the MK-12A, W78 warhead was completed in FY 1977. [Deleted].

E. MX (PE 64312F/11215F).

1. Program Description.

The MX program provides for full-scale engineering development and test leading to production of a new, more capable ICBM. The missile booster, guidance and control systems, post-boost vehicle, and reentry system are being developed, tested, and integrated into a missile system. The first flight test is scheduled for January 1983. An initial operational capability is scheduled to be achieved in 1986.

MX subsystems are planned to be operational designs of the preprototype hardware currently under development. These include: (1) an improved guidance system; (2) the MX Post-Boost Vehicle which, although significantly larger than that on MM III, would use a similar well-proven technology and configuration; and (3) the Advanced Ballistic Reentry Vehicle (ABRV) currently being developed as part of the Advanced Strategic Missile Systems (ASMS) program. The final DOD decision on the MX reentry vehicle has resulted in selection of the ABRV as the new baseline.

2. Program Status.

In early October, 1981, the Administration announced that it would continue to develop the MX and that at least 100 MX ICBMs would be deployed, but that they would not be deployed in a Multiple Protective Structures (MPS) basing mode as previously planned. Initial MX deployment will be in a limited number of MM silos. A permanent deployment mode will be decided by mid-1983. The options being considered include continuous patrol aircraft, deep underground basing, and hard silos in combination with ballistic missile defense (BMD). Ballistic missile defense research and development will be accelerated in order to assess its potential for employment in conjunction with MX deployment (See the BMD ACIS for further discussion of this question). The initial deployment of the MX in existing ICBM silos will provide a near-term improvement in the US ICBM component of the Triad.

Contracts for full-scale engineering development have been awarded for all phases of the missile. The development of the MX missile system is not a high-risk engineering effort.

The Administration included funds for full-scale development of the MX in the DOD FY 1979 Supplemental Appropriations request. This included work on the three missile stages, the post-boost vehicle, the guidance and control system, and the reentry system. Construction of the MX test facilities at

Vandenberg AFB, California is being funded under PE 11215F (MX Squadrons).

The System Design Review was conducted in September 1980, and preliminary design reviews were conducted in FY 1981 to review and approve hardware design concepts and to authorize initiation of detailed hardware designs. Completion of propulsion flight proof testing is scheduled for September 1982; the first flight test is scheduled for early 1983, and a production decision on the MX is projected for mid-1983, leading to an initial operational capability in 1986.

Estimates of the acquisition cost of the MX system are tentative, since cost depends in large measure on the details of the basing mode and the number of missiles to be deployed.

F. Procurement -- Advanced ICBM (MX).

The FY 1983 request of $1.5 billion funds the initial procurement of MX missiles and basing related hardware needed to deploy them.

G. WXX MX Warhead.

Until January 1982, the Air Force maintained the W78/MK-12A as the baseline warhead/reentry vechicle for the MX. The final DOD decision on the MX warhead has been made, resulting in the selection of a warhead to be mated with the Advanced Ballistic Reentry Vehicle (ABRV). [Deleted].

H. Advanced Strategic Missile Systems (PE 63311F).

The Advanced Strategic Missile Systems (ASMS) program provides for technology application and advanced development for ballistic missile systems, subsystems, reentry and penetration aids for existing and future ICBMs, IRBMs, and SLBMs. For each of the past five years, ASMS (formerly ABRES) funding has been approximately $100 million. A total of $50 million was requested for ASMS in FY 1982 and $52.3 million is being requested in FY 1983. However, Congress has appropriated $100 million for FY 1982. [Deleted].

[Deleted].

III. STATED MILITARY REQUIREMENTS

Current US policy is to deter nuclear war by assuring that, whatever the level of aggression contemplated, no potential adversary could ever conclude that victory in any meaningful sense of the word would be attainable or worth the costs that would be incurred. US strategy reflected in that policy requires that US plans and capabilities be structured to permit flexible employment of strategic nuclear forces. Thus, current US strategy requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of retaliatory destruction, in a selective and measured manner, of Soviet political and military control targets, military forces both nuclear and conventional, war-supporting industry, and a broad set of industrial/economic targets.

A fundamental objective of US national security is the maintenance of secure strategic nuclear retaliatory forces which could absorb any first strike and respond with an attack of such unacceptable proportions that any potential aggressor would be deterred from attacking the US or its allies. In order to accomplish this fundamental objective, the US relies on the flexible, redundant and diverse capabilities provided by a mix of strategic delivery vehicles: land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and long-range manned bombers. This strategic force structure severely complicates Soviet offensive and defensive planning and provides a hedge against Soviet technological breakthroughs or the catastrophic failure of any one element of the Triad to perform its assigned wartime missions. The complementary and muturally reinforcing character of these strategic forces enables US officials to maintain a high level of confidence in the US strategic deterrent posture.

The ICBM force provides the necessary capability for employment by the National Command Authority in any phase of a nuclear conflict, from limited options to full-scale retaliation.

The combination of accuracy, reliability, rapid retargeting, secure, survivable C^3, and ballistic penetrativity makes the land-based missile an extremely flexible system. These attributes of the land-based ICBM force, coupled with high alert rate and excellent responsiveness, have made and will continue to make a major contribution to the deterrent posture of the United States.

US strategic forces also serve broader political objectives by denying the Soviet Union any political or military benefits that might result if Soviet leaders, allies, or third countries perceived Soviet strategic forces to be superior.

While the analysis of strategic vulnerability is sensitive to many variables and scenarios, it is generally accepted that the pace and scope of Soviet ICBM programs pose a threat to the survivability of the current US fixed-silo ICBMs in the 1980s. [Deleted]. Projected deployments show this number increasing during the 1980s.

The decision to maintain the deterrent value of a survivable ICBM leg of the Triad, and to redress the political-military implications of an asymmetry in prompt hard-target-kill capabilities favoring the Soviet Union, has led to the decision to develop and deploy the MX missile.

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
TITAN Squadrons (11212F)										
Development	$ 922.8	-	-	[						]
Production	$ 862.9	-	-							
MINUTEMAN Sqdns. (11213F)	(includes C^3 integration)									
Development	$3907.3	19.6	12.9							
Production	$8678.9	54.3	-							
MK-12A RV (11213F)						DELETED				
Development	$ 145.4	-	-							
Production	$ 335.8	56.4	-							
W78 Warhead (DOE)										
Development	$									
Production	$ [									]

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
MX (64312F/11215F)										
Silo Deployment										
Development	$2311.6	1963.1	2759.5	[						]
Production	$ -	-	1497.1							
Construction	$ 140	11	207							
Follow-on ICBM Deployment										
Development	$ -	20	310							
Production	$ -	-	-			DELETED				
Construction	$ -	-	-							
WXX MX Warhead (DOE)	$ -	-	N/A							
ASMS (63311F)										
Development	$2153.3	99.6	49.7	[						]

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* TBD - To be determined based on future development/deployment decisions.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to support US national security objectives and through the achievement of these objectives to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements at reduced force levels that are genuinely stabilizing, equitable and verifiable. At the same time, it is recognized that certain basic military capabilities, to include secure strategic retaliatory capabilities, must be maintained to deter attack on, or coercion of, the United States and its allies, to protect vital national interests, and to insure strategic stability.

US arms control policy emphasizes the necessity for the verification and equity of arms control agreements. This requires improved means for verifying compliance when national technical means (NTM) will not suffice.

B. Relation to Arms Control Agreements.

1. SALT I Interim Agreement.

The 1972 SALT I Interim Agreement has expired, but both the US and the Soviet Union have stated their intention to avoid taking actions inconsistent with its provisions for the time being. SALT I permitted modernization and replacement of strategic ballistic missile systems. Although it included some restrictions on the *deployment* of new fixed land-based ICBM *launchers*, it did not limit the *development* of new *missiles* for either fixed or mobile launchers.* Thus, the development of MX, prospective improvements for MINUTEMAN, and development of a maneuvering reentry vehicle in the ASMS program, are not inconsistent with any provisions of the Interim Agreement.

2. SALT II Agreement.

The SALT II Agreement, which was to run through 1985, has not entered into force. A comprehensive interagency review of US strategic arms control policy is underway; it is the position of this administration that SALT II will not be ratified in its present form. Until the review is completed, it remains in the US interest in the near term to take actions that will avoid undermining the SALT Agreements so long as the Soviet Union exercises similar restraint and the provisions remain consistent with necessary US force modernization.

The numerical limits established by the SALT II Agreement would not have any immediate effect on the MX program, as no deployments are scheduled through 1985.

The "new types" provision of the SALT II Agreement limits each side to flight-testing and deployment of only one new type of ICBM for the duration of the Treaty. The MX will be the one new ICBM type flight-tested by the US in the foreseeable future. Article IV of the SALT II Agreement prohibits a) the conversion of launchers of light ICBMs, or of ICBMs of older types deployed prior to 1964, into launchers of heavy ICBMs of types deployed after that time, and b) an increase in the original internal volume of an ICBM silo launcher by more than thirty-two percent in the process of modernization and replacement of ICBM silo launchers. The launch-weight and throw-weight of the Soviet SS-19 are defined in the SALT II Agreement as the upper limits for "light" ICBMs, and the MX has been designed to be smaller than the SS-19 on both counts; hence, deployment of the MX which has been designated as a "light" ICBM, would not violate the first restriction. MX deployment in existing MM silos without increases in individual silo volume, would not violate the second restriction.

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* The Interim Agreement states: Article I: The Parties undertake not to start construction of additional fixed land-based intercontinental ballistic missile (ICBM) launchers after July 1, 1972.

Article II: The Parties undertake not to convert land-based launchers for light ICBMs, or for ICBMs of older types deployed prior to 1964, into land-based launchers for heavy ICBMs of types deployed after that time.

Article IV: Subject to the provisions of this Interim Agreement modernization and replacement of strategic offensive ballistic missiles and launchers covered by this Interim Agreement may be undertaken.

Except with respect to the one "new type" of ICBM that is permitted, Article IV prohibits the flight-testing or deployment of ICBMs which are different from those ICBMs flight-tested as of May 1, 1979 in the following respects:

- the number of stages;
- the length, the largest diameter, the launch-weight, or the throw-weight of the missile (but variations of up to 5% are permitted with respect to these measures);
- the type of propellant (that is, solid or liquid) of any of its stages.

No modifications of MINUTEMAN II or III are planned which would be affected by any of these limitations, and all planned ASMS flight-tests utilizing MINUTEMAN I boosters would satisfy these limitations.

The MK-12A RV and the W78 warhead in the MK-12A would not be affected by the limitations on "new types." Furthermore, the MK-12A RV was tested before May 1, 1979 and thus could not be covered by SALT II limitations concerning the weight of RVs on existing types of ICBMs.

3. The Non-Proliferation Treaty (NPT).

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 114 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon-state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As part of the 1979, two-track INF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on intermediate-range nuclear forces. The US and the USSR began the negotiations on November 30, 1981 in Geneva, Switzerland. The US held extensive consultations with its Allies in preparation for these negotiations.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to the Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

In the absence of further progress on nuclear arms control agreements, extensive nuclear modernization programs will probably lead to additional criticism of US and Soviet behavior under Article VI and could eventually weaken the effectiveness of the NPT in preventing the spread of nuclear weapons. Continuation of the strategic arms negotiations or progress in negotiations on intermediate-range nuclear forces would help to mitigate these problems.

It is also possible that US (or Soviet) programs could be cited by some governments as convenient rationalizations for building their own nuclear weapons. It must be noted, however, that many important non-nuclear-weapon countries are US allies that rely on the US nuclear arms umbrella and look upon US nuclear modernization as essential. Insofar as these countries are concerned US nuclear modernization could inhibit proliferation.

Unilateral US restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

4. The Threshold Test Ban Treaty and the Treaty on Underground Nuclear Explosions for Peaceful Purposes.

The terms of the Threshold Test Ban Treaty (TTBT) and the Treaty on Underground Nuclear Explosions for Peaceful Purposes (PNET) limit the United States and the Soviet Union to nuclear tests with design yields of no more than 150 kilotons (KT) of explosive yield. The TTBT and PNET have been signed by the US and the USSR but have not yet been ratified by either. Both the US and the USSR have stated their intentions to abide by the yield limitations of the TTBT pending ratification. [Deleted].

Final selection of the baseline MX warhead [deleted]. In this sense, deployment of the MX is constrained by the TTBT.

5. The ABM Treaty.

The ABM Treaty permits development and testing of fixed land-based ABM systems and their components at agreed test ranges. Both the Soviet Union and the US have R&D efforts in ballistic missile defense. A viable ABM defense of US ICBMs could improve ICBM survivability and is under study as an element of a long term basing option for the MX. Adoption of an ABM defense of MX could require amending the ABM Treaty or withdrawal from the Treaty.*

The availability of advanced US technology, such as advanced MaRVs, precision guidance, and penetration aids provides disincentives for the Soviets to upgrade or deploy an improved ABM system around Moscow or elsewhere by reducing its potential effectiveness in preventing the arrival of US ballistic missile RVs and thereby making its deployment economically and militarily unsound. The US R&D program could, therefore, reinforce the ABM Treaty by discouraging evasion or abrogation.

C. Effect on Current and Prospective Negotiations.

1. START.

On November 18, 1981 President Reagan announced that the US will seek to negotiate substantial reductions in nuclear arms which would result in levels that are equal and verifiable. The timing of such negotiations -- to be called Strategic Arms Reduction Talks (START) -- is being discussed with Soviet representatives. The US START proposals will be based on fair-minded principles: substantial, militarily-significant reductions in force, equal ceilings for similar types of forces, and adequate provisions for verification. The approach to verification will be to emphasize openness and creativity -- rather than the secrecy and suspicion which have undermined confidence in arms control in the past.

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* For a complete discussion, see the ACIS on Ballistic Missile Defense.

The precise form that US START proposals will take is now under review. However, the President stated on November 18, 1981, that while we can hope to benefit from work done over the past decade in strategic arms negotiations, we will do more than simply begin where these efforts previously left off. The President also said that we will attempt major qualitative and quantitative progress and seek to achieve truly substantial reductions in strategic arsenals.

The proposed MX basing systems lend themselves to flexible force sizing. The number of missiles eventually deployed could be sized upward or downward depending on the size and character of projected threats/strategic force targeting requirements. The number of MX missiles might have to increase if the Soviet threat increased. Within a strategic arms control framework, it would be easier to predict confidently how extensive an MX deployment is required to ensure an adequate ICBM retaliatory capability. The MX deployment could, of course, be sized in various ways to meet increases in the projected threat under either an arms limitation or a no-arms limitation environment.

2. The Comprehensive Test Ban Treaty (CTBT).

[Deleted]. The US has been engaged in Comprehensive Test Ban Treaty negotiations with the United Kingdom and the USSR.

These negotiations were recessed in November 1980 without setting a resumption date. All nuclear test limitations are currently under US government review. [Deleted].

D. Effect on Global and Regional Stability.

The effect of US ICBM programs on stability, particularly the impact of the October 1981 decisions on MX deployment, is overall positive. In the context of this analysis, strategic stability is defined as the maintenance of conditions such that neither the US nor the USSR is compelled or induced to employ its strategic forces. The concept of crisis stability extends beyond the nuclear balance to encompass the broader political-military relationship; the objective of crisis stability is to prevent adverse developments in US-Soviet relations outside of the strategic sphere from escalating to central nuclear war. In order to ensure stability in crises, the US seeks to maintain a strategic force posture which denies the Soviet Union any confidence in utilizing its strategic forces as instruments of political or military coercion.

In this context, considerable concern has developed over the implications for crisis stability of the increasing vulnerability of silo-based ICBMs. Less vulnerable basing options, being examined as part of the MX program, address this concern.

It is generally recognized that the Soviet ICBM force now has a much greater prompt hard-target-kill capability against our ICBM force than our force has against theirs, making our ICBMs much more vulnerable to preemptive attack. It is also recognized, however, that our ICBM force is a much smaller component of our strategic forces than the Soviet ICBM force is of their strategic forces. Differences in view on the implications of prompt hard-target-kill capability emerge over the conditions under which each side would be able or impelled to exploit the asymmetry favorable to itself for political or military purposes.

There are political as well as military reasons to retain US prompt hard-target-kill capabilities. Failure to deploy MX could lead to perceptions of Soviet advantage with the following implications: (1) greater Soviet freedom of action in the employment of conventional forces; (2) greater Soviet latitude in the implicit utilization of nuclear strength for political coercion; (3) the development of new perceptions of relative US and Soviet strength among third countries that could have a wide impact on US foreign policy; and (4) an adverse affect on Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe. Thus, the decision to build and deploy the MX missile reflects the judgment that the paramount necessities at present are to maintain the ICBM leg of the Triad's unique contribution to credible deterrence and to deny the Soviets any political or military advantages that may result from a growing asymmetry in relative ICBM capabilities. On balance, it is judged that there would be little prospect for improving crisis stability and for concrete arms control results involving Soviet ICBMs in the absence of a decision to modernize the US ICBM force.

The initial deployment of less than 50 MXs in MINUTEMAN silos constitutes an interim way of partially redressing the imbalance in prompt hard-target-counterforce capability. However, all the other options under consideration address the vulnerability problem directly, as does the program for improving command and control systems for our strategic forces. The initial deployment of MXs in fixed silos, moreover, will not represent a threat to the entire force of Soviet ICBMs, which now total about 1400.*

The effect of the MX program on stability will depend in very large part upon Soviet interpretation of its implications for the vulnerability of their strategic forces overall, and Soviet perceptions could be heavily influenced by the fact that they have about three-quarters of their strategic warheads deployed in silo-based ICBMs, while we have only about one-quarter of our strategic warheads so deployed.

Although the ultimate Soviet response to the MX will to a large extent depend upon the outcome of our future basing decisions, the basic question in the meantime is whether the Soviets interpret our overall strategic program as representing primarily an escalation of the threat to their strategic forces or recognize the new program's clear emphasis on retaliatory capability. If the Soviets recognize the retaliatory aspects of the US program, they should find opportunities for enhancing their security through arms control.

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* At a maximum, assuming 10 RVs per missile, deployment of 50 MX missiles will add only 500 highly accurate RVs to the US total, and if some MXs displace MINUTEMAN IIIs the increase in RVs will be reduced below 500 because the latter have up to 3 RVs. By the usual rule of thumb of 2 RVs per silo, 500 additional RVs would threaten only 250 more Soviet ICBMs.

The effects of MX deployment on regional stability will be felt most in the perceptions of US allies. In Western Europe and elsewhere, ICBM force modernization programs could affirm US resolve to pursue equivalency with the Soviet Union in strategic forces, and could strengthen perceptions of US determination to prevent strategic force asymmetries which would provide political or perhaps military advantages to the Soviet Union.

E. Technological Implications.

The sophistication of the R&D included in US ICBM programs would not be expected to stimulate technological competition with countries other than the Soviet Union.

ASMS technology, with the possible exception of AMaRV and precision guidance activities, is unlikely to stimulate additional Soviet efforts along similar lines.

The deployment by the US of systems which would significantly improve missile accuracy or the pursuit of technology programs (e.g., AMaRV or precision guidance) which could provide even greater accuracies, could stimulate continued competition with the Soviet Union in this area, [deleted]

[deleted].
The Soviets could also turn to basing modes offering increased survivability.

F. Potential Interaction with Other Programs.

The strategic modernization program will guide the long term development of the US strategic forces. It will help redress the deteriorated strategic balance with the Soviet Union. The result will be a deterrent that is far more secure and stable than exists today. The program will also provide a force that is more resilient to Soviet attempts to negate US progress. This should, in turn, create the incentives necessary for the Soviets to respond seriously to proposals for meaningful and equitable arms reductions.

G. Verification.

The basic SALT II Agreement explicitly permits modernization and replacement of strategic weapon systems, including the development of mobile ICBM launchers, and after the Protocol was to have expired on December 31, 1981, deployment of and flight-testing from mobile ICBM launchers. SALT I and SALT II place constraints on the testing and deployment of "new types" of ICBMs. Under these provisions, modernization and replacement of ICBMs within set boundaries and deployment of one new light ICBM are permitted. Deployment of a new fixed ICBM can be verified by US and Soviet national technical means, as has been the case in the past.

Although permitted by the basic SALT II Agreement after the expiration of the Protocol, the deployment of a mobile ICBM, particularly a Soviet mobile ICBM, could raise verification problems.

The essential feature of all mobile-basing schemes -- concealment of the precise location of the missile/launcher -- would complicate the task of verifying that the number of launchers deployed does not exceed prescribed limits. However, such mobile strategic forces could be verified even though they are not subject to continuous observation, as has been the case with ballistic missile submarines (SSBNs). There are, however, important distinctions with consequences for verification between ICBMs and SSBNs. For ground-mobile ICBM schemes, cooperative measures would be required to provide adequate assurance that agreed limitations were being observed.*

Since Soviet technology for ground-mobile launchers is already well developed, the Soviet Union could respond to the increased threat posed by MX by deploying ground-mobile ICBMs. [Deleted]. The different intelligence-gathering environments in the two countries would make it more difficult for the US to monitor compliance without adequate cooperative measures [deleted].

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* Cooperative measures: measures taken by one side in order to enhance the other side's ability to verify compliance with the provisions of an agreement. Such measures can be voluntary or negotiated.

It is clear that the increased capabilities of each side's strategic forces place increased burdens on monitoring capabilities, although such obstacles can be overcome by negotiated agreement and cooperative measures if both sides desire to do so.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The increasing vulnerability of the MINUTEMAN force, the necessity to maintain the deterrent contribution of the ICBM leg of the Triad, the political and military implications of an asymmetry in ICBM capabilities (including prompt, hard-target-kill capabilities) favoring the Soviet Union, and the on-going and projected overall buildup of Soviet strategic forces have led to the decisions to build the MX missile and to continue upgrading the MINUTEMAN force. The decision to deploy an MX reflects the judgment that the paramount necessities are to maintain the ICBM leg of the Triad's unique contribution to credible deterrence and to deny the Soviets any political or military advantages that may result from a major asymmetry in relative ICBM capabilities. The greater capability of the MX will maintain the US ICBM force's retaliatory capabilities, further redressing the perception, and the reality, of increased Soviet advantages in certain force characteristics. Improved prompt hard-target-kill capabilities also could permit the US to attain an effective capability against

Soviet military and command/control targets which have been increasingly hardened.

There are political as well as military reasons to retain US hard-target-kill capabilities. Failure to deploy MX could lead to perceptions of Soviet advantage with the following implications: (1) greater Soviet freedom of action in the employment of conventional forces; (2) greater Soviet latitude in the implicit utilization of nuclear strength for political coercion; (3) the development of new perceptions of relative US and Soviet strength among third countries that could have a wide impact on US foreign policy; and (4) an adverse affect on Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe.

Deployment of the MX and modifications to the MINUTEMAN would be consistent with the terms of SALT I and II. These agreements would allow modifications of existing weapon systems within specific constraints, and the SALT II agreement would permit deployment of one new type ICBM.

Full deployment of 100 MXs could result in an increase in US prompt hard-target-counterforce capability to the point that the Soviets perceived a substantially greater threat to their ICBM force. The new US strategic program will raise fundamental questions for the Soviets about their heavy reliance upon vulnerable first-strike strategic weapons as the US improves its less vulnerable second-strike capabilities.

Although permitted by the basic SALT II Agreement after the expiration of the Protocol, Soviet deployment of a mobile

ICBM could raise serious verification problems. Soviet technology for mobile launchers is well developed. Cooperative measures will be an essential element in any future strategic arms control agreement, and their significance will be significantly enhanced if it is necessary to monitor future Soviet ground-mobile ICBM deployments.

SSBN/SLBM PROGRAMS

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11221N	Fleet Ballistic Missile System (Improved Accuracy Program)
11228N	TRIDENT Submarine (SSBN)
11228N	TRIDENT I (C-4) Missile
63371N	TRIDENT II Missile System
DOE Program	W76 (TRIDENT I)
Procurement	TRIDENT
Procurement	UGM-96A (C-4) TRIDENT I
Procurement	UGM-73A (C-3) POSEIDON
Procurement	UGM-73A (C-3) POSEIDON Modifications
11402N	Navy Strategic Communications
Procurement	EC-130Q Procurement and Modifications
11401N	Extremely Low Frequency (ELF) Communications

These programs are all related since each contributes directly to the Nuclear Ballistic Missile Submarine/Submarine Launched Ballistic Missile (SSBN/SLBM) component of US strategic capabilities. Arms control impact statements are required by the Arms Control and Disarmament Act for each of these programs.

II. PROGRAM DESCRIPTIONS

A. Capabilities.

The TRIDENT submarine, missile, and warhead programs are designed to provide a new class of fleet ballistic missile submarines and associated SLBMs to augment and eventually replace the present POLARIS and POSEIDON strategic submarines. US strategic submarines have the peacetime mission of deterrence of nuclear war, and the wartime missions of strategic and theater nuclear strikes, as well as deterrence of further escalation.

Fleet Ballistic Missile (FBM) System (PE 11221N).

This program element contains three projects designed to fund development and maintenance of POSEIDON and TRIDENT I strategic weapons systems as well as other improvement projects for fleet ballistic missile submarines. As such, it would extend the effectiveness, survivability and capabilities of both the current and future nuclear powered submarine ballistic missile systems.

The FBM System Project (J0091-SB) has focused on improvements to SSBN unique sonars and strategic weapons systems. The Sonar Evaluation Program was started in FY 1975 to provide continuing objective assessment of SSBN sonar system performance in the operational environment. FY 1982 efforts were aimed at reliability and maintainability improvements to present FBM sonar systems. Vulnerability and effectiveness studies have been conducted to identify potential improvements to maintain the survivability of US SSBNs against postulated threats and increase the capability of weapons systems. These efforts will continue in FY 1983. The development effort for the conversion of a cargo ship to a FBM cargo ship (TAK) to service SSBNs with spare parts, food supplies, and other essentials led to the award of a conversion contract in April 1981. The Navy is also validating NAVSTAR Global Positioning System (GPS) performance as FBM user equipment under this project.

The SSBN Unique Sonar Project (S0942) is an effort to maintain the acoustic advantage of US SSBNs over Soviet nuclear submarines in the future. This is most relevant for [deleted] in a multicontact environment such as that found in the North Atlantic and Mediterranean patrol areas. This project is designed [deleted]. Existing off-the-shelf Navy standard processing and display hardware is being utilized in this effort. The evaluation of the BQR-15 array modification is planned for completion in FY 1982 with production to begin in FY 1983.

The SSBN Unique Countermeasure Development Project

(S1265) was transferred to PE 11221N from PE 64562N in FY 1981. [Deleted]. The design and fabrication phases specified by the AN/BLR-14 ECPs were completed and proof testing began in FY 1981. In FY 1982 in-plant testing continues and will be validated by at-sea tests. A total procurement of [deleted] is planned. The plan for FY 1983 is to conduct technical and operational evaluation of the AN/BLR-14 countermeasures receiving set improvements.

TRIDENT Submarine (PE 11228N) and TRIDENT Procurement.

At the end of FY 1982, 544 operational US submarine ballistic missile launchers in 33 TRIDENT and POSEIDON submarines will be in commission. The inventory will consist of 304 POSEIDON C-3 launchers in 19 POSEIDON submarines, 192 TRIDENT I C-4 launchers in 12 POSEIDON submarines, and 48 TRIDENT I C-4 launchers in 2 TRIDENT submarines. There are 15 TRIDENT SSBNs in the January 1981 Five Year Defense Plan with the total number to be built as yet undermined.* See TABLE 1 for TRIDENT characteristics.

The TRIDENT, also known as the OHIO class submarine, displaces 18,700 tons when submerged. It is designed to operate at greater maximum speeds and emit less noise than the POSEIDON and POLARIS submarines. In addition, TRIDENT is expected to stay on patrol longer than POSEIDON submarines over the lifetime of the system, largely due to shorter refits and overhauls. Its greater at-sea time, combined with the longer range of its missiles, permits basing in the United States, and the eventual phasing out of the present POSEIDON base overseas. In this regard, it should be noted that the use of Rota, Spain as an SSBN upkeep site was discontinued in the summer of 1979. The site was relocated to Kings Bay, Georgia. The use of Guam as a SSBN upkeep site was discontinued in the fall of 1981.

The sea trials commenced in June 1981 for the first submarine; the initial operational capability (IOC) date of the lead TRIDENT submarine, the OHIO, is September 1982. Plans are to deploy the first TRIDENT submarines in the Pacific from a base at

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* All ten POLARIS submarines, each armed with 16 POLARIS missiles, have been withdrawn from the strategic force. Five POLARIS SSBNs were withdrawn in FY 1980 and five during FY 1981. Two of the POLARIS SSBNs were dismantled in February 1981 in accordance with agreed procedures of the Standing Consultative Commission (SCC) to comply with the terms of the SALT I Interim Agreement. The remaining 8 SSBNs are still considered as SALT accountable. Their missiles have been (or soon will be) off loaded and their weapons systems inactivated.

TABLE 1: Planned TRIDENT Submarine Characteristics

Operational:	
Maximum Speed (submerged)	about [deleted] knots
Endurance:	
Range	bounded by crew and supply constraints
Stores	90 days
Armament:	
Torpedo Tubes	4
SLBM Tubes	24
Availability of SSBNs operationally ready at-sea	66%
Technical:	
Length	560 ft.
Beam (maximum hull diameter)	42 ft.
Draft, Navigational	36.5 ft.
Displacement (submerged)	18,700 tons
Operating Depth	[deleted] ft.
Propulsion: type	Nuclear
shaft horsepower	[deleted].hp.
Crew Size	157

Bangor, Washington. Almost all targets in the Soviet Union will be in range of TRIDENT I missiles from TRIDENT submarines operating in the Pacific. Deployment of TRIDENT I missiles in the Atlantic in POSEIDON or TRIDENT SSBNs will allow the coverage of all Soviet targets.

The Navy has chosen Kings Bay, Georgia as the site for the east coast TRIDENT submarine base. The base has also been developed to support the 12 POSEIDON submarines that are being modified to receive TRIDENT I missiles.

TRIDENT submarines will be manned by two alternating crews of 157 men (15 officers, 142 enlisted). The 95-day operating cycle will consist of a 25-day refit period followed by a 70-day at-sea period. Crew endurance is the dominant limiting factor in the TRIDENT's ability to stay at-sea.

B. Program Status.

There have been 9 TRIDENT submarines authorized through FY 1981. Long-lead funding has been authorized for a total of 11 TRIDENTs. Funding estimates included in the submarine program are based on the latest experience in ship construction and reflect current OSD guidance on anticipated inflation rates. The FY 1982 request included full funding for the tenth TRIDENT submarine but was denied by Congress. Advance procurement to order critical long lead ship components for the eleventh and twelfth TRIDENT submarines, plus funding for escalation cost on prior year ships are still being considered and will be reported out of the Senate-House Conference Committee at a later date. This additional escalation is required to cover the differences between what was previously budgeted for the earlier ships and the escalation rates now being experienced. The ultimate size of the TRIDENT submarine force has not been determined and will depend on many factors, including: (a) assessments of the size and capability of Soviet strategic and ASW forces; (b) the cost-effective life span of the POSEIDON SSBN force; (c) possible ceilings on strategic forces negotiated in strategic arms reductions negotiations; and (d) the acceptability of alternative strategic programs when compared to TRIDENT.

After studying the cost-effectiveness the Navy has decided to extend the service life of POSEIDON submarines to about 30 years. Major policy decisions affecting the role for SLBMs or changes in US targeting requirements could influence the ultimate

TRIDENT force size, as could Strategic Arms Reduction Talks (START) limits. A basic TRIDENT building rate of one SSBN per year is projected See TABLE 2 for the TRIDENT construction schedule.

The first 6 TRIDENTS are scheduled to be deployed by the end of 1986. If TRIDENT SSBN's were constructed as now projected, the US would have [deleted]. When coupled with the 31 POSEIDON SSBNs, this force would contain 832 launchers,* an increase from 656. With MIRVed SLBM launchers the increase is from 496 to 832. (See TABLE 2).

TRIDENT I (C-4) Missile (PE 11228N) and TRIDENT I Procurement.

A total of [deleted] TRIDENT I missiles would be procured for the first [deleted] TRIDENT submarines, POSEIDON backfits, testing, and spares: [deleted] to be deployed on TRIDENT and POSEIDON submarines and [deleted] for testing, logistical support, and spares. A total of [deleted] TRIDENT I SLBMs would be acquired for the 12 POSEIDON submarines and [deleted] for testing, logistical support, and spares. A total of [deleted] TRIDENT I SLBMs would be acquired for the 12 POSEIDON submarines which are being modified to carry the TRIDENT I missile, [deleted] for submarine equipment, and [deleted] for testing and logistical support. See TABLE 3 for characteristics of the TRIDENT I (C-4) Missile.

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* Twelve of the POSEIDON SSBNs will have been backfitted to carry TRIDENT I missiles and 19 will remain with POSEIDON missile loads.

TABLE 2: SSBN/SLBM Schedule (for end of FY)

Cumulative Forces After Initial Sea Trials

	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89
TRIDENT SSBNs*	0	0	1	2	3	5	6	8	9	10	11
with TRIDENT I SLBMs	0	0	24	48	72	120	144	192	216	240	264
TRIDENT SSBNs	0	0	0	0	0	0	0	0	0	0	0
with TRIDENT II SLBMs**	0	0	0	0	0	0	0	0	0	0	0
POSEIDON SSBNs*	0	5	11	12	12	12	12	12	12	12	12
with TRIDENT I SLBMs	0	80	128	192	192	192	192	192	192	192	192
POSEIDON SSBNs*	31	26	20	19	19	19	19	19	19	19	19
with C-3 SLBMs	496	416	320	304	304	304	304	304	304	304	304
POLARIS SSBNs*	10	5	0	0	0	0	0	0	0	0	0
with A-3 SLBMs	160	80	0	0	0	0	0	0	0	0	0

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* Each TRIDENT SSBN w/TRIDENT I SLBMs may carry an operational load of up to [deleted] RVs. The decision as to which RV will be used on the TRIDENT II system has not yet been made. However, studies indicate that TRIDENT II SLBMs on TRIDENT II SSBNs could carry as few as [deleted] RVs with [deleted] KT warheads or as many as [deleted] RVs with [deleted] KT warheads to total as many as [deleted] RVs per SSBN. Each POSEIDON SSBN w/TRIDENT I SLBMs will carry a normal operational load of [deleted] RVs; each POSEIDON SSBN w/C-3 SLBMs, [deleted] RVs [deleted]; each of the 16 POLARIS A-3 SLBMs carried the equivalent of one independently-targetable RV, although each missile dispersed 3 RVs around a single target.

** The first TRIDENT SSBN with TRIDENT II missiles is programmed to be deployed in December [deleted].

TABLE 3: Characteristics of the TRIDENT I (C-4) Missile

Operational:		
	Maximum range at full payload ([deleted] RVs)	4230 NM
	Maximum range ([deleted] or fewer RVs)	[deleted] NM
	System accuracy (CEP)	[deleted] NM at 4000 NM range
	System reliability	[deleted]
	Maximum re-entry vehicles per missile	[deleted] RVs
	Explosive yield per warhead	[deleted] KT
Technical:		
Weight:	Launch weight	[deleted] lbs.
	Throw-weight	[deleted] lbs.
	Re-entry vehicle weight	[deleted] lbs.
Size of missile:	Length	34.1 ft.
	Diameter	6 ft. 2 in.
Guidance		Stellar-aided inertial
Propulsion		Solid fuel

The 25 missile TRIDENT I flight test program was completed on July 31, 1979. Eighteen missiles were launched from a pad at the Eastern Missile Test Range and 7 more from a POSEIDON SSBN. The IOC for the TRIDENT I missile in a backfitted POSEIDON SSBN occurred on October 20, 1979.

TRIDENT I missiles are equipped with the MK-4 re-entry vehicle. TRIDENT I missiles are also being tested with MK-500 EVADER Maneuvering Re-entry Vehicle (MaRV) whose feasibility was demonstrated successfully in earlier tests. This is a first generation MaRV that could be used to counter Anti-Ballistic Missiles (ABMs) should the Soviets upgrade or expand their existing ABM systems in the future. The objective of the MK-500 program is to obtain, by the end of FY 1982, a [deleted] year readiness posture to an IOC through periodic [deleted] participation in TRIDENT I missile flight tests-of-opportunity. The MK-500 also could provide the technology base for future advanced maneuvering re-entry vehicles. There are no plans at this time to produce the MK-500.

TRIDENT I (W76) Warhead (DOE Program).

The TRIDENT I missile MK-4 re-entry vehicles are equipped with the W76, a [deleted].

A warhead for the TRIDENT II missile has not yet been chosen. Options being considered by DOE and DOD include [deleted].

TRIDENT II Missile (PE 63371N).

In October 1981 the President formally approved his Strategic Forces Modernization Program. Part of this decision was to pursue the development of the TRIDENT II, or D-5 missile, with an IOC of [deleted]. See TABLE 4 for characteristics of the TRIDENT II missile.

UGM-73A (C-3) POSEIDON Maintenance and Mods Procurement.

The POSEIDON SLBM concept originated as a result of advanced POLARIS A-3 design studies. Its development was started in 1965, and it became operational in 1971. POSEIDON's increased

TABLE 4: Characteristics of the TRIDENT II Missile*

Maximum range at full payload	4300 NM
Maximum range with reduced payload	[deleted] NM
System accuracy (CEP)	[deleted] ft. at 4000 NM range
System reliability	[deleted]
Explosive yield	[deleted] KT
Guidance options	To be determined
Propulsion	Solid fuel
Throw-weight	6000 lbs. (max.)

size and advanced design enabled it to deliver roughly [deleted] the payload with [deleted] the accuracy of the POLARIS A-3. The program to convert 31 SSBNs from POLARIS to POSEIDON began in early 1969 and was completed in 1978. Although POSEIDON missiles are no longer in production, funds are required to sustain support of the POSEIDON weapon system. $28.8 million was requested for FY 1982 with $18.7 million for such tasks as special purpose flight test instrumentation, special purpose material components for the missile's warhead, replacement of components with limited life, and $10.1 million for missile modifications.

Navy Strategic Communications (PE 11402N) and TACAMO (EC-130Q) Procurement.

The Navy Strategic Communications Program contains two major projects. The Shore-to-Ship Communications Systems Project (X1083) is responsible for the development and improvement of reliable, secure and survivable communications to deployed fleet ballistic missile submarines. The Navy Strategic Communications Program will continue the development, testing, and procurement of improved systems, components and antennas for shore and submarine-based communications systems. The TACAMO Project (W0793) concerns communications suite improvement and nuclear hardening of the TACAMO airborne communications platform.

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* All figures are conceptual and planning goals which may be revised.

TACAMO consists of a fleet of EC-130Q aircraft fitted with an array of communications equipment for receiving emergency action messages from the National Command Authorities and relaying them via a very low frequency (VLF) system to deployed SSBNs. The SSBNs receive the messages by [deleted]. The latter is the primary method since it minimizes the possibility of potential detection [deleted] by enemy forces. Although a number of surface, airborne, and satellite-based communications systems [deleted] are used on a day-to-day basis to communicate with strategic submarines, TACAMO is considered to be the primary means of communicating with SSBNs in a trans or post-attack environment.

Currently, TACAMO aircraft maintain a continuous air-borne alert only in the Atlantic Ocean area. Airborne alert is maintained in the Pacific Ocean area [deleted]. The coming deployment of TRIDENT SSBNs in the Pacific will increase the size and importance of the Pacific SSBN force, as well as the deployment

ment area to be covered by TACAMO, and require the maintenance of an expanded airborne alert operation. [Deleted]. Additional EC-130Q aircraft are planned for procurement to increase the force level to 18 aircraft. A Service Life Extension Program was initiated in FY 1979 to extend the life of older aircraft. The Navy Strategic Communications Program would provide for upgrade of the communications equipment.

The TACAMO improvement program will continue TACAMO nuclear vulnerability assessment and the production and installation of improvements for the airborne communications system to increase its effectiveness and reliability. Under the FY 1982 TACAMO procurement program, funds are requested for the production of two additional EC-130Q aircraft and spares, and for continuing the Service Life Extension Program. Additional aircraft are planned for procurement through FY 1985 to maintain the force level at 18 aircraft while retiring older aircraft which have reached the end of their service life.

A new EMP hardened airframe to replace the EC-130 in performing the TACAMO mission is being developed. The new airframe, designated ECX, is capable of providing continuous two-ocean coverage. The ECX has been structured to permit an IOC in FY 1988.

Extremely Low Frequency (ELF) Communications Program (PE 11401N).

The ELF program provides for the development of a shore-to-submarine peacetime communications system. It would provide a reliable, secure link from operations headquarters and the National Command Authorities to SSBNs and nuclear attack submarines (SSNs) operating at optimum speeds and depths in operational areas without the necessity of using potentially observable trailing antennas or buoys. [Deleted] for day-to-day operations only, since it is vulnerable and not expected to survive in wartime.

The President's Strategic Forces Modernization Program includes the making of the US strategic communications and command systems more survivable in order to enhance communication with the strategic nuclear forces even after attack. The ELF system would consist of 56 miles of antenna in Michigan, with a transmitter at K.I. Sawyer AFB, tied electronically to a [deleted] mile antenna and transmitter at an existing test facility in Wisconsin. In [deleted] operation, the two transmitters would be able to provide communications coverage for [deleted] of the Atlantic and Pacific Oceans.

Congress approved $20 million for ELF in the FY 1979 budget but withdrew $15 million for other purposes in FY 1980. In FY 1981 Congress appropriated an additional $2.5 million for research and development work. These funds are being utilized to begin two limited test programs.

III. STATED MILITARY REQUIREMENTS

All ten POLARIS submarines have been withdrawn from the strategic mission at about the end of their designed 20 year life span, and the existing POSEIDON SSBN fleet is aging. The originally designed 20 year life span of POSEIDON has been extended to about 30 years. The TRIDENT SSBN program is intended to assure that the US retains a highly survivable sea-based strategic force far into the future based on foreseeable advances in Soviet ASW capabilities.

Current US policy is to deter nuclear war by assuring that, whatever the level of aggression contemplated, no potential adversary could ever conclude that a victory in any meaningful sense of the word would be attainable or worth the costs that would be incurred. US strategy reflected in that policy requires that US plans and capabilities be structured to permit flexible employment of strategic nuclear forces. Thus, currently the US requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of retaliatory destruction, in a selective and measured manner, of Soviet political and military control targets, military forces both nuclear and conventional, war-supporting industry, and a broad set of industrial/economic targets.

The SSBN/SLBM programs described earlier provide for systems which are the most survivable elements of US strategic forces while at sea and thus provide an important and enduring element to our nuclear deterrent. These programs go beyond strict replacement of the present SSBN/SLBM force in that they are intended to maintain the survivability of US strategic submarines and provide increased capabilities for these survivable forces. Such steps to improve sea-based retaliatory capabilities are particularly important in view of the current strategic imbalance with the Soviet Union and the increased capability of Soviet strategic forces against US strategic forces -- especially US fixed landbased ICBMs.

The ELF program and the TACAMO improvement program would provide more secure, reliable communication links from the National Command Authorities to deployed fleet ballistic missile submarines. This would improve US command and control of these nuclear weapon systems while reducing their potential for detection by adversary antisubmarine warfare (ASW) forces.

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
TRIDENT Submarine (PE 11228N)										
Development	$ 842.9	60.5	[		]					
Production	$9040.0	436.2								
Construction	$ 773.6	112.7								
TRIDENT I (C-4) Missile (PE 11228N)										
Development	$3621.4	41.5								
Production	$4868.7	906.3		Deleted						TBD*
Construction	$ 100.7	5.4								
TRIDENT II Missile (PE 63371N)										
Development	$ 143.2**	198.7								
Production	$ -	-								
Construction	$ -	-	[		]					

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* To be determined.

** Includes $19.9 and $16.0 Million respectively for USNS Vanguard.

IV. FUNDING ("then year" $ in millions) (Continued)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
POSEIDON Procurement (UGM-73A)										
Procurement	$2397.8	18.7	[		Deleted				]	
Modification	$ 211.3	10.1	[						]	
TRIDENT I (W76) Warhead (DOE Program)										
Development	[				Deleted				]	
Production	[								]	
Fleet Ballistic Missile (FBM) Systems (PE 11221N)										
Development	$ 570.4	10.8	[						]	
Construction	$ 30.1	-								
Navy Strategic Communications (PE 11402N)					Deleted					
Development	$ 64.9	19.7								
Production	$ 139.8	95.4	[						]	

IV. FUNDING ("then year" $ in millions) (Continued)

	FY 81 & Prior	FY 32	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Extremely Low Frequency (ELF) Communications (PE 11401N)										
Development	$ 143.5	34.8	[		Deleted				]	
Construction $	-	0	[						]	

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to support US national security objectives and through the achievement of these objectives to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements that are genuinely stabilizing, equitable and verifiable. At the same time it is recognized that certain basic military capabilities, to include secure strategic retaliatory capabilities, must be maintained to deter attack on, or coercion of, the United States and its allies, to protect vital national interests, and to insure strategic stability.

US arms control policy emphasizes the necessity for the verification and equity of arms control agreements. This requires improved means for verifying compliance when national technical means (NTM) will not suffice.

The strategic forces modernization program is necessary to ensure the military capability needed to achieve national security objectives. Additionally, it will help redress the current strategic imbalance with the Soviet Union. The result will be a deterrent that is far more secure and stable than exists today. The program will also give us a force that is more resilient to Soviet attempts to negate our progress. This should, in turn, create the incentives necessary for the Soviets to respond seriously to proposals for meaningful and equitable reductions.

As currently planned, the introduction of TRIDENT submarines begun in FY 1981 will result in: (1) a [deleted].

[Deleted].

B. Relation to Arms Control Agreements.

A comprehensive interagency review of US strategic arms control policy is currently underway. Pending completion of this review, the US has stated that it will not undertake any action that would undermine existing agreements as long as the USSR continues to do the same.

1. SALT I Interim Agreement.

When the 1972 Interim Agreement expired, both the US and the USSR stated their intentions to take no action inconsistent or incompatible with its provisions as long as the other side does so, although neither party has a legal obligation to do so. The expired Agreement placed restrictions on the number of ballistic missile submarines and SLBM launchers that could be deployed by each side.* The US has dismantled two POLARIS submarines under these restrictions. For the Soviet Union, this has meant dismantling launchers on several older ballistic missile submarines to compensate for launchers on new DELTA and TYPHOON SSBNs.

2. SALT II Agreement.

The SALT II Agreement was signed in June 1979, but it has not been ratified. It is the position of this administration that SALT II will not be ratified in its present form.

SALT II included a Treaty which was to last through 1985, a Protocol which lasted through 1981, and a statement of principles to guide further strategic arms reduction negotiations.

The SALT II Agreement called for an initial aggregate ceiling of 2400 on strategic nuclear delivery vehicles (SNDVs)--

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* Under the Interim Agreement, the US was limited to 710 SLBM launchers on 44 SSBNs while the Soviet Union was limited to a maximum of 950 SLBM launchers on 62 SSBNs. However, in reaching these levels, the sides agreed to dismantle an older ICBM or SLBM launcher for each new SLBM launcher beyond specified initial thresholds -- for the United States 656; for the Soviet Union 750.

ICBM launchers, SLBM launchers, air-to-surface ballistic missiles (ASBMs) capable of a range in excess of 600 kilometers, and heavy bombers -- which were to be reduced to 2250 by the end of 1981. A subceiling of 1320 was placed on the combined total of MIRVed ICBM and SLBM launchers, MIRVed ASBMs, and air launched long-range[*] cruise missile carrying heavy bombers (AHBs). A second subceiling of 1200 was placed on the combined total of MIRVed ICBM launchers and SLBM launchers as well as MIRVed ASBMs. A third subceiling of 820 was placed on MIRVed ICBM launchers alone. Unlike the SALT I Interim Agreement, there were no separate limits on numbers of ballistic missile submarines under SALT II. At present, the US has a combined total of 2271 SALT-accountable strategic delivery vehicles (1975 of which are operational):[**] 1053 ICBMs (550 MINUTEMAN IIIs, 450 MINUTEMAN IIs, and 53 TITAN IIs), 648 SLBM launchers (128 POLARIS A-3s, 400 POSEIDON C-3s, and 120 TRIDENT C-4s), and 570 heavy bombers including a number of mothballed and cannibalized aircraft.[***] Thus, the US is below the 2400 aggregate ceiling on launchers.[****]

The US made clear that the SALT II Agreement would not affect existing patterns of collaboration and cooperation with its Allies, nor would it preclude cooperation in modernization. The US specifically stated that the transfer of weapons systems numerically limited by the SALT II Agreement was not necessarily precluded. Consistent with this position the UK Government plans to purchase sufficient missiles complete with multiple independently targetable re-entry vehicles (carrying British built warheads) on a continuing basis to maintain a force of 4 or possibly 5 new British built submarines that would replace the existing British POLARIS sea-based strategic missile force in the early 1990s.

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[*] Greater than 600 km.

[**] 2 POLARIS submarines have been dismantled, and 8 are still operational but have been removed from a strategic role. They are, however, still counted under SALT accountable totals.

[***] These figures reflect the dismantlement of two POLARIS SSBNs and the conversion of 6 POSEIDON SSBNs to TRIDENT C-4s.

[****] The Soviet Union with over 2500 strategic nuclear delivery vehicles (SNDVs) would have to dismantle or destroy over 250 SNDVs to get beneath the aggregate ceilings.

3. TRIDENT and the Non-Proliferation Treaty (NPT).

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 114 other countries are parties, states:

> Each of the parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,....

Representatives of many non-nuclear weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to foreswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapons state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As part of the 1979 two-track TNF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on intermediate range nuclear forces. The US and the USSR began the negotiations on November 30, 1981, in Geneva, Switzerland. The US held intensive consultations with its Allies in preparation for these negotiations.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapons states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint would weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

The TRIDENT SSBN/SLBM programs could be constrained by other existing arms control agreements. The terms of the Threshold Test Ban Treaty (TTBT) limit the US and the Soviet Union to nuclear tests of no more than 150 KT of explosive yield. The TTBT has been signed but has not been ratified by either party. Both the US and USSR have stated their intentions to abide by the yield limitation of the TTBT, pending ratification. [Deleted].

C. Effect on Current and Prospective Negotiations.

1. START Negotiations.

On November 18, 1981 President Reagan announced that the US will seek to negotiate substantial reductions in nuclear arms which would result in levels that are equal and verifiable. The timing of such negotiations -- to be called Strategic Arms Reduction Talks (START) -- is being discussed with Soviet representatives. The US START proposals will be based on fair-minded principles: substantial, militarily-significant reductions in force, equal ceilings and adequate provisions for verification. The approach to verification will be to emphasize openness and creativity -- rather than the secrecy and suspicion which have undermined confidence in arms control in the past.

2. Indian Ocean.

The increased operating room provided by the Indian Ocean might be of future use to US SSBN/SLBM forces and might become necessary if there were a major Soviet ASW breakthrough that imperiled the US ballistic missile submarine force or a Soviet abrogation of the ABM Treaty and major new efforts to build ABMs. Either Soviet move might require US SSBN deployments to launch points in the Indian Ocean complicating the Soviet defense problem. Any serious consideration of a "Zone of Peace" or "Nuclear Free Zone" in this area must consider this potentiality.

3. Comprehensive Test Ban.

The US has been engaged in Comprehensive Test Ban negotiations which were recessed in November 1980 without setting a resumption date. [Deleted].

D. Effect on Global and Regional Stability.

The TRIDENT submarine, missile, and related programs will significantly enhance the military capability and maintain the survivability of US SSBN/SLBM forces. TRIDENT SSBNs, POSEIDON SSBNs equipped with TRIDENT missiles, associated warhead programs, and related communications upgrade programs should assure that the US continues to maintain a credible, survivable sea-based strategic retaliatory force, even taking into account foreseeable developments in Soviet ASW capabilities. Because of the greater range of TRIDENT missiles, US strategic submarines have many times more available ocean operating area. This, combined with improvements in speed and quietness, would make the TRIDENT even more survivable against Soviet ASW forces than are existing SSBNs, which already possess an extremely high degree of survivability. No impending Soviet ASW development seems likely to pose a significant threat to TRIDENT.

By preserving the survivability and enhancing the capability of the US deterrent, our TRIDENT program, in conjunction with other force modernization plans, will increase the confidence of US Allies in the readiness and ability of the United States to react to the modernization of Soviet strategic systems and thereby prevent the USSR from obtaining a perceived or real strategic advantage that could undermine the credibility of the US deterrent. The deactivation of SSBN/SLBM bases in Europe removes the visible linkage that those bases currently provide with the strategic deterrent.

As US silo-based ICBMs become more vulnerable* to Soviet strategic weapons, US SSBNs could come to assume increasing importance in guaranteeing the secure US retaliatory capability necessary to deter nuclear attack upon this country or its Allies, and to help insure a fundamental strategic stability.

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* See ICBM ACIS for discussion of additional programs to increase US ICBM survivability.

Consequently, the TRIDENT SSBN program, the TRIDENT I and II SLBM programs, and the associated SSBN communication improvement programs are essential to US security and to strategic stability.

Deployment of the TRIDENT II missile would complement other programs designed to compensate for US fixed ICBM vulnerability. The improved counter-silo and other hard-target capabilities likely to be offered by TRIDENT II will also be useful in meeting our requirements for a credible deterrence in the 1990s, and in providing a hedge against vulnerability of the other legs of the Triad. The survivability of the TRIDENT II SLBM would also enhance crisis stability insofar as it would contribute to an enduring retaliatory force that could inflict damage across the spectrum of Soviet targets.

E. Technological Implications.

Deployment of the TRIDENT II, and/or other US systems with hard-target-kill capabilities, could add incentives for the Soviets to reduce their ICBM vulnerability. By deploying more of their capability at sea, or on mobile ICBMs, they may improve Soviet strategic force survivability, which, in turn, may enhance strategic and crisis stability, although mobile ICBM deployments could also make verification more difficult. Whether the Soviets would actually respond to the TRIDENT II program with a new SLBM/SSBN or ICBM program would probably depend on a number of factors such as the speed of the US deployment, the cost of such changes to them, and the degree to which they perceived their silo based ICBMs to be threatened.

F. Potential Interaction with Other Programs.

The strategic modernization program will guide the long term development of the US strategic forces. It will help redress the current strategic imbalance with the Soviet Union. The result will be a deterrent that is far more secure and stable than the present US nuclear force. This should, in turn, create better incentives for the Soviets to negotiate genuine arms reductions.

G. Verification.

[Deleted]. Although SSBNs and SLBM launchers are concealed for a part of their life and deployment cycles, they periodically emerge providing an opportunity to confirm existing operating numbers. The number of strategic submarines and SLBM launchers can be monitored by Soviet national technical means. Thus, neither the TRIDENT SSBN/SLBM nor other US SSBN/SLBM strategic offensive forces will cause verification problems.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The TRIDENT and POSEIDON submarine and missile systems should sustain for the foreseeable future the already high survivability of the US ballistic missile submarine force. The range of the TRIDENT I and II missiles will make available to US strategic submarines far more ocean operating area than is available to present POSEIDON SSBNs, and should present a formidable problem to foreseeable Soviet ASW forces. Their relatively high survivability, due to increased operating area, would be further enhanced by the anticipated improvement in quieting of TRIDENT submarines. The TRIDENT program will also add to the US retaliatory capabilities deployed to deter a suprise attack.

Deployment of TRIDENT submarines and missiles will [deleted]. Presently scheduled US SSBN/SLBM deployments could result in an increase of more than [deleted] SLBM nuclear warheads by 1987. [Deleted] are not inconsistent with the US policy of restoring the strategic balance and creating incentives for the Soviets to negotiate genuine arms reductions.

TRIDENT I missiles are considered retaliatory weapons and their deployment will enhance strategic stability. The TRIDENT II missile, potentially has increased hard-target-kill capability.

This potential for increased hard-target-kill capability might be viewed as offsetting whatever political and military benefits that the Soviets might otherwise secure by increases in their own hard-target-kill capabilities. Further, it is possible that improvements in US counter-silo capabilities could move the Soviets toward a more stable force configuration (e.g., ballistic missile submarine programs or mobile systems that would provide them with a more secure retaliatory force). Finally, an increased US hard-target-kill capability would provide the US with an improved and enduring wartime capability against hard targets in the USSR.

In summary, the SSBN/SLBM and associated communication programs analyzed here have beneficial arms control implications.

AIRBORNE STRATEGIC OFFENSIVE SYSTEMS

I. INTRODUCTION

This arms control impact statement on Airborne Strategic Offensive Systems addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11113F	B-52 Squadrons and Associated Procurement
DOE Program	B83 Modern Strategic Bomb
64361F	Air Launched Cruise Missile (ALCM) and Associated Procurement
DOE Program	The ALCM Warhead Program (W80-1)
64738F	Protective Systems (B-52)
64226F/11126F	B-1B Bomber

These programs are analyzed together because they each would contribute to the continued viability of the air-breathing element of the US strategic Triad; consequently, their arms control implications are likely to be similar. Continuous modernization of the airborne component of US strategic forces is intended to maintain the effectiveness and credibility of the US strategic nuclear deterrent. Analysis of these major programs in concert is necessary to gain full understanding of their arms control implications, and to reflect developments in Soviet air defense capabilities.

II. PROGRAM DESCRIPTIONS

A. B-52 Squadrons and Associated Procurement (PE 11113F).

This program element consists of several major projects to maintain the combat effectiveness of the B-52 strategic bomber force against projected enemy threats of the 1980s. The purpose of this program element is to fund the B-52 operation, to develop the B-52 cruise missile carrier modifications and to evaluate and develop the weapon system upgrades necessary for maintaining the viability of the B-52 weapon system throughout the coming decade. These extensive modifications are designed to improve the aircraft's reliability and maintainability, upgrade the bombing navigation system for launching cruise missiles, and reduce weapon system support costs. These projects are described below.

The B-52 Aircraft Modernization Program (AMP) is designed to transition the B-52G/H force from a penetration to a cruise missile carriage mission. The following items are considered minimum requirements for this program: [deleted]. During [deleted] all major subsets of the AMP will be installed on flight test aircraft and fully involved in a combined development test and evaluation/initial operational test and evaluation program.

B-52H Cruise Missile Integration provides external and internal cruise missile carriage capability for the B-52H. This project will allow an initial operational capability (IOC) of FY 1986. In FY 1983/1984, test aircraft modification is to be completed, and missile launch will be accomplished. It is expected that the necessary data to start the aircraft modernization program will be obtained and the project completed.

B. B83 Modern Strategic Bomb.

The B83 bomb is being developed to enhance the effectiveness of the strategic nuclear gravity bomb stockpile. The B83 would upgrade the capability of US strategic aircraft to deliver weapons [deleted] allowing US tactical and strategic aircraft the option of delivering their weapons while [deleted].

The B83 provides greater flexibility in targeting and employment. It also is designed to be effective against hardened Soviet ICBM silos and launch complexes, command, control and communication installations, and nuclear storage sites. The B83 [deleted] incorporates improved safety and security features. [Deleted]. A modern parachute design will permit the B83 to be dropped at high speed from very low altitudes. The parachute is designed to withstand the shock of weapon delivery at transonic and supersonic speeds.

The B83 incorporates improved safety and security features. It is one-point safe by the present criterion* and would be protected by modern permissive action link (PAL) systems,** as well as design features which include [deleted]*** non-violent command disable options.**** Insensitive high explosive in the B83 provides significant protection against accidental detonation of the high explosive and thereby decreases the probability of the dispersal of nuclear materials.

[Deleted].

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* One-point safe means that the probability of achieving a nuclear yield greater than four pounds of TNT equivalent shall not exceed one in one million in the event of a detonation initiated at the single most sensitive point in the high explosive system.

** A permissive action link is a coded switch which serves as a mechanistic supplement to the administrative controls exercised over nuclear weapons employment. When installed they make weapon-enabling, or access to the weapon itself, dependent upon code possession.

*** [Deleted].

**** The command disable feature cannot be activated until a code is inserted. [Deleted].

TABLE 1: Cumulative B83 Warhead Deliveries (Projected)

[Deleted]

C. Air-Launched Cruise Missile (ALCM) and Associated Procurement (PE 64361F).

The ALCM is a small, unmanned, long-range, accurate, self-propelled weapon delivery vehicle which -- in contrast to ballistic missiles -- has an air-breathing engine and is continuously powered through the atmosphere using aerodynamic lift. It incorporates technological advances in a number of areas, including lightweight, highly efficient turbofan engines, miniaturized electronics, modern nuclear warhead design, and advanced guidance systems. The Department of Defense FY 1983 budget plan contains funds for the completion of ALCM development and the continuation of associated procurement programs. B-52H aircraft are being modified to carry up to eight ALCMs internally on an enlarged rotary launcher and twelve externally on two new, large pylons mounted under the wings. The B-52G bomber is being modified to carry twelve ALCMs externally. The B-1B bomber will be capable of carrying up to 22 ALCMs.

The ALCM will provide the bomber force with a nuclear-armed air-to-ground missile which can be launched from inside or outside enemy air defenses. It will increase targeting and routing flexibility and reduce bomber exposure to air defenses. Because of its performance characteristics, flight profile, and penetration mode, the cruise missile will present Soviet air defenses with a more diversified threat, thereby preventing the Soviets from concentrating their resources on any one system. The high accuracy of the ALCM will increase the air-breathing forces' retaliatory capabilities against a broad spectrum of targets, including hard targets. ALCMs will also have excellent potential to deny the Soviets [deleted].

Current plans for deployment of ALCMs are in an evolutionary stage. At this time, [deleted] B-52Gs and [deleted] B-52Hs are planned for modification to carry ALCMs. The B-1B will be capable of carrying ALCMs. Initially, 12 ALCMs will be loaded externally, but by the late-1980s eight additional ALCMs per B-52, loaded internally on a rotary launcher, could replace the current complement of gravity bombs and short-range attack missiles. The first conversion of a non-test B-52G as an ALCM carrier was completed in September 1981. An IOC of one B-52G squadron equipped with 12 external ALCMs each and the offensive avionics system update is projected for December 1982. The ALCM operational and technical characteristics are summarized in Table 2.

D. W80-1 ALCM Warhead (DOE Program).

The W80-1, [deleted] will be used for the Air Launched Cruise Missile. The W80-1 will incorporate an insensitive high explosive and other improved safety and command and control features. [Deleted] the W80-1 would improve the effectiveness and flexibility available

TABLE 2: ALCM Operational and Technical Characteristics

	DEVELOPMENT ESTIMATE	APPROVED PROGRAM	CURRENT ESTIMATE
Operational Characteristics (AGM-86B)			
1. Range: System Operational (km) A/		[Deleted]	
2. Speed (Mach): a. Maximum Penetration			
b. Cruise B/			
Technical Characteristics (AGM-86B)			
1. W80-1 Yield (KT)		[Deleted]	
2. Air Vehicle: a. Weight (lbs.)	N/S C/	N/S	[Deleted]
b. Length (in.)	N/S	N/S	[Deleted]
c. Diameter (in.)	N/S	N/S	[Deleted]

A/ System Operational Range takes into account all operational limitations of the system to effectively engage the target (operational fuel, allowance for indirect routing, speed, and altitude variations).

B/ Speed used to achieve System Operational Range.

C/ Not specified.

to the National Command Authority.

[Deleted].

TABLE 3: Cumulative W80-1 Warhead Deliveries (Projected).

[Deleted]

ALCM

E. Protective Systems (PE 64738F).

The purpose of the Protective Systems program is to develop, test and evaluate new countermeasures equipment for strategic aircraft. The FY 1983 program will include funding for: [deleted]

[deleted] derived from these developments will help ensure continued mission effectiveness of the bomber force through the 1980s and 1990s.

F. B-1B Bomber (PE 64226F/11126F)

The B-1B bomber will be a new strategic weapon system able to perform as a penetration bomber, a cruise missile launch platform, and a conventional bomber in either a tactical or strategic role. The aging B-52s are judged as losing their ability to penetrate Soviet defenses sometime in the late 1980s, and it is recognized that the bomber force can best realize its mission objectives by both being able to penetrate and to deliver ALCMs from a stand-off mode. The B-1B will provide a flexible, large-payload delivery aircraft capable of penetrating Soviet defenses well into the 1990s and which also will be capable of delivering ALCMs. These bomber systems capitalize on the ability to apply human judgment in real time throughout the full spectrum of conflict.

A modernized bomber force consisting of B-1Bs and Advanced Technology Bombers (ATB) will be built and deployed. Development will proceed simultaneously, with an initial operational capability for the B-1B in 1986, and for the ATB in the early 1990s.

III. STATED MILITARY REQUIREMENTS

A fundamental objective of US national security is the maintenance of secure strategic nuclear retaliatory forces which could absorb any first strike and respond with an attack of such unacceptable proportions that any potential aggressor would be deterred from attacking the US or its allies. In order to accomplish this fundamental objective, the US relies on the flexible, redundant, and diverse capabilities provided by a mix of strategic delivery vehicles: land-based intercontinental ballistic missiles, submarine-launched ballistic missiles, and long-range manned bombers. This strategic force structure severely complicates Soviet offensive and defensive planning and provides a hedge against Soviet technological breakthroughs or the catastrophic failure of any one element of the Triad to perform its assigned wartime missions. The complementary and mutually reinforcing character of these strategic forces enables US officials to maintain a high level of confidence in the US strategic deterrent posture. The airborne element of US strategic forces, moreover, possesses advantages which are not offered by the other legs of the Triad.

Current US policy is to deter nuclear war by assuring that, whatever the level of aggression contemplated, no potential adversary could ever conclude that victory in any meaningful sense of the word would be attainable or worth the costs that would be incurred. US strategy reflected in that policy requires that US plans and capabilities be structured to permit flexible employment of strategic nuclear forces. Thus, current US strategy requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of retaliatory destruction, in a selective and measured manner, of Soviet political and military control targets, military forces both nuclear and conventional, war-supporting industry, and a broad set of industrial/economic targets.

The programs described in this arms control impact statement represent a comprehensive and sustained effort to maintain the effectiveness of the airborne strategic offensive component of the Triad, and to increase the diversity of these forces with the introduction of long-range, air-launched cruise missiles.

The US intends to rely on a mixed force of penetrating bombers and stand-off bombers with cruise missiles to ensure the effectiveness of the air-breathing forces against future Soviet air defenses. These Soviet defenses are not limited by current arms control agreements and are expected to include large numbers of low-altitude-capable, quick-reaction SAMs and look-down/shoot-down interceptors integrated with an advanced Soviet AWACS capable of vectoring interceptors to targets.

The US is continuing the research and development of more advanced long-range cruise missiles to offset expected improvements in Soviet air defenses. These include R&D and technology programs to improve cruise missile performance throughout the 1980s and beyond.

The Defense Department has projected a requirement that [deleted] B-52G [deleted] be equipped to carry 12 cruise missiles per aircraft and [deleted] B-52H [deleted] be equipped to carry up to 20 ALCMs per aircraft. The B-1B will be able to carry up to 22 ALCMs. This combination should contribute to the continued viability of the air-breathing forces in the threat environment postulated for the next ten to 15 years. In order to meet the potentially more demanding technological and mission requirements generated by projected improvements in the lethality of Soviet air defenses, the Defense Department is continuing to develop a new manned penetrating bomber for deployment in the early 1990s.

The introduction of long-range cruise missiles will improve the target coverage and routing flexibility of the strategic bomber force. The ALCM's effective stand-off range permits launch well outside the envelope of current Soviet air defenses, thereby reducing bomber mission profile requirements for high-speed low-altitude penetration. The ALCMs, moreover, have considerable potential for improving strategic bomber force effectiveness in the penetrating role by providing a capability for local exhaustion, saturation and leakage through Soviet low-altitude area and point defense. Depending on mission requirements, ALCMs could also increase recoverability of bomber assets -- which could contribute to the reconstitution of an enduring reserve force for use in a post-attack environment.

The extreme accuracy of the ALCM and the modernization of gravity weapons should also contribute to overall US force effectiveness and flexibility by improving bomber force capabilities against the increasing hardness of the Soviet target base. The ALCM's combination of yield and accuracy could make it a flexible weapon for selective attacks against a wide range of non-time-urgent military targets.

IV. FUNDING ("then year" $ in millions)

	FY 81& Prior	FY 82	FY 83 (est)	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
B-52 Squadrons and Associated Procurement (PE 11113F)										
Development $	[			Deleted			]			
Production $	[						]	N/A	N/A	
B83 Modern Strategic Bomb (DOE Program)										
Development $	[			Deleted						]
Production $	[									]
Air-Launched Cruise Missile (ALCM) and Associated Procurement. (PE 64361F)										
Development $	[			Deleted				]		
Production $	[							]		

IV. FUNDING (Con't) ("then year" $ in millions)

	FY 81& Prior	FY 82	FY 83 (est)	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
The ALCM Warhead Program (W80-1) (DOE Program)*										
Development $										
Production $										
B-52 Protective Systems (PE 64738F)										
Development $	[			Deleted				]		
Production $	[							] N/A	N/A	
B-1B Bombers (PE 64226F/11126F)										
Development $	[			Deleted						]
Production $	[									]

* Funding not available N/A

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to support US national security objectives and through the achievement of these objectives to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements that are genuinely stabilizing, equitable, and verifiable. At the same time, it is recognized that certain basic military capabilities, to include secure strategic retaliatory capabilities, must be maintained to deter attack on, or coercion of, the United States and its allies, to protect vital national interests, and to insure strategic stability.

US arms control policy emphasizes the necessity for the verification and the equity of arms control agreements. This requires improved means for verifying compliance when national technical means will not suffice.

The strategic forces modernization program is necessary to insure the military capability needed to achieve national security objectives. Additionally, it will help to redress the current strategic imbalance with the Soviet Union. The modernization of the B-52, the procurement of the B-1B, the deployment of air-launched cruise missiles, and the development of advanced aircraft technologies contribute to the continued viability of the bomber element of the Triad.

B. Relation to Arms Control Agreements.

A comprehensive interagency review of US strategic arms control policy is currently under way. Pending completion of this review, the US has stated that it will not undertake any action that would undermine existing agreements as long as the USSR continues to do likewise.

1. The SALT II Treaty.

The SALT II Treaty was signed in June 1979 but it has not entered into force pending ratification. It is the position of this administration that SALT II will not be ratified in its present form.

The provisions of the SALT II Agreement included a 1320 limit on the combined total of launchers of MIRVed (multiple independently targetable reentry vehicle) strategic ballistic missiles, MIRVed air-to-surface ballistic missiles (ASBMs), and heavy bombers equipped with cruise missiles capable of a range in excess of 600 km. Of this total of 1320, no more than 1200 could be launchers of MIRVed missiles and ASBMs. This would have allowed deployment of 120 heavy bombers equipped with cruise missiles capable of ranges greater than 600 km, without any offsetting reductions in launchers of MIRVed ballistic missiles and ASBMs; a larger number of aircraft equipped with long-range cruise missiles could be deployed if fewer than 1200 MIRVed ballistic missile launchers and ASBMs were deployed.

Under the provisions of the SALT II Agreement, any deployment of aircraft equipped with ALCMs capable of a range in excess of 600 km would be counted against the SALT overall ceiling limits and the sublimits on MIRVed missile launchers and heavy bombers equipped with cruise missiles. Aircraft on which long-range ALCMs are deployed would be counted as heavy bombers in both the 2250 aggregate ceiling for strategic delivery vehicles and the 1320 sub-ceiling on the total of MIRVed missile launchers, ASBMs and heavy bombers equipped for long-range cruise missiles. These limitations would have applied to all weapon-delivery (nuclear or conventional) ALCMs capable of ranges in excess of 600 km.

One additional element of the SALT II Agreement is the Joint Statement of Principles and Basic Guidelines for subsequent Negotiations on the Limitation of Strategic Arms. In the Joint Statement of Principles, both Parties agreed to pursue the following objectives in future negotiations, taking into consideration factors that determine the strategic situation: (1) significant and substantial reductions in the number of strategic offensive arms; (2) qualitative limitations on strategic offensive arms, including restrictions on the development, testing, and deployment of new types of strategic offensive arms and on the modernization of existing strategic offensive arms; and (3) resolution of the issues included in the Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms in the context of the negotiations relating to the implementation of the principles and objectives set out therein.

2. The Non-Proliferation Treaty (NPT).

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 114 other countries are parties, states:

> "Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,..."

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon-state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As part of the 1979, two-track TNF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on intermediate-range nuclear forces. The US and the USSR began the negotiations on November 30, 1981 in Geneva, Switzerland. The US held intensive consultations with its Allies in preparation for these negotiations.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

3. The Threshold Test Ban Treaty (TTBT).

[Deleted].

The programs analyzed in this ACIS are not affected by any other existing arms control treaty or obligation.

C. Effect on Current and Prospective Negotiations.

1. Strategic Arms Reduction Talks.

On November 18, 1981 President Reagan announced that the US will seek to negotiate substantial reductions in nuclear arms which would result in levels that are equal and verifiable. The timing of such negotiations -- to be called Strategic Arms Reduction Talks (START) -- is being discussed with Soviet representatives. The US START proposals will be based on fair-minded principles: substantial, militarily-significant reductions in force, equal ceilings, and adequate provisions for verification. The approach to verification will be to emphasize openness and creativity -- rather than the secrecy and suspicion which have undermined confidence in arms control in the past.

The development of cruise missiles, particularly ALCMs, and their launch platforms will provide the United States with a certain amount of leverage in future START negotiations. The possibility of a major increase in US strategic capabilities in the absence of SALT reductions, as suggested by cruise missiles and related force improvement programs, could enhance the chances of a balanced and verifiable agreement in future negotiations.

2. Comprehensive Test Ban Treaty.

The US has been engaged in Comprehensive Test Ban Treaty (CTBT) negotiations with the UK and the USSR. These negotiations were recessed in November 1980 without setting a resumption date. [Deleted].

[Deleted].

D. Effect on Global and Regional Stability.

The improvements envisaged for US airborne strategic offensive forces should contribute to crisis stability. The upgrading of B-52 avionics systems, the deployment of ALCMs, the procurement of B-1B bombers, and the continuing development of advanced aircraft technologies will help to maintain the effectiveness of the US airborne strategic offensive forces in the face of improving Soviet air defenses. Since either penetrating bombers or stand-off aircraft equipped with long-range cruise missiles take at least several hours after takeoff to deliver their weapons on target, such forces clearly are not a first-strike (disarming) threat against the USSR. Their considerable retaliatory capability enhances deterrence, while their slowness of delivery makes them inappropriate for use in any attack against time-urgent hard targets in the Soviet Union.

At a time of fixed-silo ICBM vulnerability, the strategic bomber contribution to US retaliatory capabilities has become even more important. They could greatly complicate the Soviets' already formidable air defense problem. Systems based on advanced technologies will enhance the deterrent value of the airborne element of the Triad and thus will have a positive effect on global and regional stability. ALCMs and related programs, by helping to assure the retaliatory capability of the bomber force, will contribute to strategic and crisis stability.

E. Technological Implications.

The United States possesses an advantage in advanced cruise missile technology, with an estimated lead of five or more years over the Soviet Union. ALCM is not a wholly new type of weapon; it represents the integration of a series of improvements in a number of technologies. Nevertheless, development of small highly accurate, long-range cruise missiles with small, high-yield-to-weight nuclear warheads would present formidable technical obstacles to states other than the current nuclear weapon states over the next few years.

If they believed it necessary, the Soviets could respond to US deployment of ALCMs in one or more of the following ways: (1) increasing efforts to deploy a defense against both cruise missiles and their associated launch platforms; (2) accelerating their development of a modern cruise missile capability; (3) upgrading their overall existing strategic offensive systems.

The Soviets could respond to US ALCM and associated bomber programs by accelerating their present modernization of low altitude air defenses. The Soviet SA-10 surface-to-air missile [deleted]. Interceptors with a look-down/shoot-down capability designed to operate with a possible Soviet counterpart to the US AWACS* [deleted]

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* These interceptors if deployed in large numbers together with the AWACs will have [deleted].

[deleted].

The Soviet Union can also respond to the US ALCM program by developing, testing, and deploying long-range cruise missiles and suitable carrier aircraft. It is more likely that the development of a long-range Soviet cruise missile would be in response to Soviet military requirements and not in reaction to the US deployment of ALCMs. [Deleted]

[deleted]. The Soviets might well be attracted [deleted] could narrow the US lead in force loadings and improve their overall capability against US targets. [Deleted].

Several US NATO allies have expressed interest in a long-term program of cooperation to develop a stand-off missile for the late 1980s/early 1990s for the defense of Western Europe. The US rejected Soviet attempts to include a non-transfer provision in the SALT II negotiations regarding cruise missiles and other systems limited by the Agreement. A generalized non-circumvention provision was agreed to by the US. The US has previously assured the NATO allies that the SALT II Agreement would neither affect existing patterns of cooperation between the US and its allies, nor preclude cooperation in modernization.

Development of cruise missiles by other nations is likely to be influenced more by internal considerations of strategy, politics, economics, and technology than by prestige considerations, or US actions or inaction. [Deleted]. The United Kingdom has shown interest in long-range cruise missiles as well.

Development of small long-range cruise missiles could present formidable technical obstacles to many other states, and especially developing countries, over the next few years. Although the aerodynamic design and turbofan engine technology are within the technological state-of-the-art for some developed countries, the fabrication of small, lightweight nuclear warheads and the microminiaturization of computer systems would require considerable technological sophistication and economic resources. For countries, however, who intend to use cruise missiles for less demanding missions, the development of relatively unsophisticated cruise missiles could be a more practical alternative.

F. Potential Interaction With Other Programs.

The strategic modernization program will guide the long-term development of the US strategic forces. It will help redress the current strategic imbalance with the Soviet Union. The result will be a deterrent that is far more secure and stable than the present US nuclear forces. This should, in turn, create better incentives for the Soviets to negotiate genuine arms reductions.

G. Verification.

Cruise missiles represent a class of weapons that raises troublesome verification problems, particularly over the longer term. As a result, as cruise missile programs and technology mature, future arms control agreements will require more detailed and stringent cooperative measures in order to assure adequate verification.

Cruise missiles, when compared to ballistic missiles, are smaller, fly lower, have smaller radar and infrared signatures, can use smaller, simpler and less easily identifiable launchers and support facilities and can be launched from a wide variety of air, sea, and land platforms. Their relatively low cost makes them feasible for the delivery of conventional as well as nuclear weapons. Cruise missiles of similar size and external configuration could have significantly different range capabilities, nuclear or conventional payloads, guidance systems, and missions. Each side would have to overcome difficult problems in order to be able to determine the particular fuel exhaustion range, payload, and launch platform of a given cruise missile. To the degree that such elements are or become the subject of constraints under arms control agreements, verification would become more complicated.

In contrast with U.S. efforts to monitor Soviet cruise missile programs, the open US society affords the Soviets considerable advantages in monitoring ALCM development, production, and deployment. The problem of verifying compliance with limits on ALCM carriers is not insurmountable. Many opportunities for monitoring an adversary's cruise missile program over a length of time would exist. Some testing of ALCMs on designated aircraft would be necessary before they could be deployed confidently, thereby allowing opportunities for identifying cruise missile carriers. These judgments are based on the assumption that [deleted] current US national technical means continue to be available in the future.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

In the face of improving Soviet air defenses, the procurement of ALCMs and the B-1B while developing advanced technologies is necessary to maintain the effectiveness of the strategic bomber force. The programs described in this statement will improve US retaliatory capabilities and thus strengthen deterrence, crisis stability, and create incentives necessary for the Soviets to respond seriously to US proposals for meaningful strategic arms reductions. At the same time, the strategic bomber force clearly will pose no first-strike threat to USSR strategic forces.

The introduction of ALCMs on B-52s [deleted]. Such increases in US strategic weapons might be perceived as contravening US arms control objectives of reducing nuclear weapon stockpiles. These increases, however, must be seen in the light of the need to maintain adequate military capability to execute the national strategy and achieve US national security objectives, to correct the existing strategic force imbalance, and to restore strategic stability. These programs are consistent with US arms control policy.

The Soviets might respond to US ALCM deployments in a variety of ways, including: (a) further improvements to their air defense system; (b) acceleration of their strategic weapons build-up beyond the scope of present plans; (c) increased willingness to pursue negotiated arms limitations; or (d) some combination of the above. However, without off-setting adjustments in US forces, a US decision unilaterally to restrict cruise missile deployment and new bomber procurement would lead to US strategic forces that were not capable of supporting US national security objectives.

Programs to ensure the continued effectiveness of the airborne strategic offensive force support US arms control and national security goals of deterring nuclear war or coercion, and maintaining international stability through the preservation of a credible threat of assured retaliation. These programs contribute to the reliability, survivability, and penetrativity of the air-breathing element of the strategic Triad and are consistent with US arms control objectives.

SPACE DEFENSE

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
64406F	Space Defense Systems (Anti-Satellite)
63438F	Satellite Systems Survivability
63428F	Space Surveillance Technology
12424F	SPACETRACK and Associated Procurement
62301E	Strategic Technology
12450F	Space Defense Operations

The Space Defense Systems (Anti-Satellite) program is developing alternative methods of destroying objects in space. The Space Surveillance Technology program and the SPACETRACK program would provide the surveillance, tracking, prediction, attack assessment, warning and targeting capabilities necessary for an anti-satellite (ASAT) capability. The other programs are directly related to the development of a US space defense capability. The Air Force Satellite Systems Survivability program would provide the technology for both active and passive satellite system defense measures. The Defense Advanced Research Projects Agency (DARPA) Strategic Technology program will identify the feasibility of technology for improved space surveillance and anti-satellite capabilities through application of [deleted]. The Space Defense Operations program would procure the necessary operations and maintenance support facilities given a decision to deploy an operational ASAT capability. The Space Surveillance Technology and the SPACETRACK programs also could contribute to US anti-satellite monitoring capabilities. The overall capability of the United States to defend its own and nullify other nations' objects in space will be determined by these programs together. Hence, their arms control implications should be analyzed in the aggregate.

II. PROGRAM DESCRIPTIONS

The Space Defense Systems Program (SDSP) effort involves four functional areas: (1) anti-satellite systems; (2) space systems survivability; (3) space surveillance systems; and (4) command and control. The programs described below would provide the anti-satellite systems, the satellite and satellite control station survivability measures, the capabilities for detecting and tracking, mission assessment, and, in conjunction with the Commander-in-Chief, Aerospace Defense Command (CINCAD) Space Defense Operations Center (SPADOC), command and control for targeting the ASAT system.

A. Space Defense Systems (PE 64406F).

Under this program, the Air Force has examined alternative non-nuclear methods of destroying objects in space; each has certain advantages and disadvantages. [Deleted]

[deleted] satisfying near-term US requirements. The two major projects of the Space Defense Systems Program are discussed below.

1. Miniature Systems.

[Deleted]

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* Altitudes of satellites are measured from mean sea level.

[deleted]. Typical system characteristics are shown in TABLE 1. [Deleted] is shown in FIGURE 1.

Following competitive design review, a contract was awarded in September 1977 for full scale development and ground testing of prototypes [deleted]. Ground testing of the [deleted] will start in [deleted]. Manufacture of flight test hardware will also begin, continuing [deleted]. During [deleted] qualification testing on the [deleted] will be finished. If directed by the Secretary of Defense, the [deleted]. A total of [deleted] ASAT missiles is proposed for procurement through [deleted]. A target initial operational capability (IOC) for the [deleted].

Baseline planning for the [deleted] CONUS bases. [Deleted]. Full operational capability would require approximately [deleted] missiles. [Deleted].

[Deleted]

TABLE 1: Typical Anti-Satellite Systems Characteristics.

Deleted

FIGURE 1:.

Deleted

[deleted].

Conventional ASAT subsystem designs and tests were [deleted] as a lower risk technology back-up [deleted]. The objective is to [deleted].

The conventional ASAT would provide a [deleted].

2. Advanced Systems.

This project examines [deleted] systems which could provide a high payoff in the future, on the assumption that the associated technology could be developed sufficiently. [Deleted]

[deleted]. The FY 1982 and 1983 planned programs will continue to investigate [deleted].

[Deleted].

B. Satellite Systems Survivability (PE 63438F).

The objective of this program is to develop [deleted] devices that could be deployed on key US satellites to enhance their survivability in a hostile environment. The FY 1982 program includes: [deleted] (2) the integration of warning information from these sensors into the CINCAD Space Defense Operations Center; [deleted]

[deleted] (4) the conceptual designs of survivable launch systems so that critical satellite capabilities could be [deleted] and [deleted].

The FY 1983 planned program will reinitiate earlier requirements such as: [deleted] and (2) [deleted] scheduled for initial operational capability in [deleted].

C. Space Surveillance Technology (PE 63428F).

This program seeks to improve the SPACETRACK detection and tracking system. The objective is to upgrade the capabilities of this component of the Department of Defense Space Detection and Tracking System (SPADATS) for ranges out to geosynchronous altitudes. The various R&D tasks involve improving tracking and prediction hardware and software, providing a capability for tactical assessment of satellite missions, developing an attack assessment and warning capability, and developing a capability for targeting US ASATs and evaluating the effectiveness of the attack. Following the completion of R&D, these capabilities would be integrated into the operational SPACETRACK system.

The FY 1982 program has continued design, development and space qualification of the Space Infrared Sensor (SIRE) payload [deleted]

[deleted]. The objective of this project is to provide [deleted] and contribute to US [deleted] monitoring and surveillance capabilities. These efforts include the development of [deleted] for space object detection and tracking. [Deleted].

The 1983 planned program will continue to expand the near-term improvements. SIRE efforts will proceed with [deleted] will be computed and analyzed, leading to a [deleted].

D. SPACETRACK (PE 12424F) and Associated Procurement.

The SPACETRACK program will support satellite attack warning and verification, rapid alerting for [deleted]. The thrust of these efforts is to: (1) provide a Pacific Radar Barrier to furnish [deleted] (2) convert the Defense Advanced Research Projects Agency (DARPA) Maui optical site Space Object Identification Facilities to SPACETRACK for [deleted] (3) provide improved [deleted] and (4) provide a [deleted] global Ground-based Electro-Optical Deep Space Surveillance (GEODSS) system that could detect and track satellites [deleted].

Near term improvements include the integration of existing space tracking R&D assets into a coherent system, and the development of the ground-based electro-optical surveillance system to increase SPACETRACK detection and tracking altitude [deleted]. The operational network, when deployed, would consist of [deleted] sites around the world. This includes one in the continental United States with a planned IOC in [deleted].

The [deleted] planned program will continue deployment of [deleted] GEODSS sites with the IOCs of the remaining [deleted] scheduled through [deleted]. Final operational capability for GEODSS is planned for [deleted]. The FY 1983 planned program will [deleted].

E. Strategic Technology (PE 62301E).

This DARPA program includes two separate technology projects which could, if proved feasible, have direct application in support of the space defense mission.

1. High Energy Laser Technology.

This project examines the future [deleted]

[deleted].

The FY 1982 and FY 1983 HEL programs will concentrate on three technology areas: [deleted]. In the first area, [deleted]. In the second area, [deleted]. The third area will continue in FY 1983 to concentrate on [deleted]. Pending FY 1982 budget action, the Air Force will address overall system issues. [Deleted].

2. Space Object Identification.

The space defense related goal of this project is to develop and demonstrate advanced techniques for high payoff capabilities in space object identification. The Compensated Imaging System is designed to obtain resolution of [deleted] to assist in determining [deleted]. This [deleted] will permit the development of new strategic defense concepts such as [deleted].

F. Space Defense Operations (PE 12450F).

[Deleted] the ASAT capability being developed under the Space Defense Systems Program [deleted]. This program would [deleted] (1) a facility for testing, checkout and repair of the ASAT vehicles; (2) a training facility to maintain launch crew proficiency; and (3) additional anti-satellite system handling and launch facilities to be installed at selected locations. The FY 1982 and FY 1983 planned programs would [deleted]. It should be noted that procurement and completion of these facilities would depend upon [deleted] to provide an operational ASAT capability.

III. STATED MILITARY REQUIREMENTS

The United States' ability to utilize its military power continues to be increasingly dependent on the effective and reliable operation of various satellite systems; [deleted]. Space systems provide critical strategic and tactical support to military forces and political leaders in the areas of attack warning, navigation, surveillance, communications, intelligence and meteorology. [Deleted]. Although the US [deleted] maintain redundant capabilities in some systems not dependent on the use of space, the [deleted].

The Soviet Union began to test anti-satellite systems in [deleted]. They have [deleted] actually has been observed being tested [deleted].

Although [deleted]

[deleted].

A [deleted].

The Soviets [deleted]

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* [Deleted].

[deleted].

[Deleted]. (See the separate ACIS [deleted] for further information.)

[Deleted].

The US currently [deleted] did have a [deleted] system deployed at Johnston Island from 1964 until 1975. The system employed THOR boosters and [deleted] and operated [deleted] against low-altitude [deleted] targets only. The Johnston Island system was initially a response to Soviet threats to deploy orbital weapons of mass destruction. The system was deactivated because this threat was never deployed (and the Outer Space Treaty prohibited its employment), and because a low-altitude [deleted] would probably damage US satellites [deleted] as well as the targeted Soviet satellite. The US is also actively [deleted].

The Air Force ASAT system [deleted].

Other facets of the US space defense program seek to improve US satellite detection, tracking, assessment, and attack warning capabilities, and to develop and integrate survivability technologies and techniques for satellites, launch systems, and ground control stations. While it is recognized that technological improvements cannot make space systems [deleted] it is possible [deleted] more difficult, more visible, more costly, and less certain of success.

To a lesser degree, the [deleted]

[deleted].

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Space Defense Systems (PE 64406F)										
Development $	245.7	200.9	211.8	179.1	cont.	N/A	N/A	N/A	N/A	cont.
Production $							N/A			
Satellite Systems Survivability (PE 63438F)										
Development $	72.2	11.1	22.5	38.3	cont.	N/A	N/A	N/A	N/A	cont.
Production $							N/A			
Space Surveillance Technology (PE 63428F)										
Development $	171.1	23.7	40.3	46.6.	cont.	N/A	N/A	N/A	N/A	cont.
Production $							N/A			

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
SPACETRACK (PE 12424F)										
Development $	22.5	8.0	5.5	5.1.	cont.	N/A	N/A	N/A	N/A	TBD*
Production $	58.6	20.2	4.0	cont.	cont.	N/A	TBD	N/A	N/A	TBD
Strategic Technology (PE 62301E)										
Development $	58.1	46.6	44.7	59.8.	cont.	N/A	N/A	N/A	N/A	TBD
Production $							N/A			
Space Defense Ops. (PE 12450F)										
Development $	14.5	1.1	6.5	2.9	cont.	N/A	N/A	N/A	N/A	TBD
Production $				32.8	cont.		TBD	TBD	TBD	

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* To Be Determined.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The arms control policy with regard to space defense is under review.

B. Relation to Arms Control Agreements.

The following existing legal obligations impose certain restraints on ASAT activities:

1. The Outer Space Treaty establishes a general norm of peaceful uses of outer space. Article III states that the space activities of States Parties to the Treaty shall be conducted "... in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding." Article IV prohibits the placement in orbit, installation on celestial bodies, or stationing in outer space of nuclear weapons or any other kinds of weapons of mass destruction. In addition, Article IX requires international consultations prior to any planned space activity or experiment if the State undertaking it has reason to believe such activity or experiment would cause potentially harmful interference with the peaceful space activities of others.

2. The Limited Test Ban Treaty prohibits the Parties to the Treaty from carrying out nuclear explosions of any kind in space.

3. Other international agreements extend specific protections to certain classes of satellites. The US and the USSR

have undertaken express obligations not to interfere with each other's national technical means (NTM)* of verification under the ABM Treaty. Under the Direct Communications Link Improvement Agreement, both nations have confirmed their intention to take all possible measures to assure the continuous and reliable operation of the emergency satellite system; and under the International Telecommunications Convention, each party is obligated to avoid harmful interference with the radio services or communications of other parties.

4. In addition, [deleted].

5. Finally, the Convention on Registration of Objects Launched into Outer Space provides cooperative means to monitor some space activities. Parties to the Convention shall provide:

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* However, NTMs are not defined in any international agreement.

(a) name of launching state or states; (b) an appropriate designation of the space object, or its registration number; (c) date and territory or location of launch; (d) basic orbital parameters, including nodal period, inclination, apogee, and perigee; and (e) general function of the space object.

None of these agreements would affect US development of potential space defense systems as long as the testing of such systems did not violate any of the above obligations. [Deleted].

C. Effect on Current and Prospective Negotiations.

1. General.

The US will continue to pursue an operational ASAT system [deleted] if an agreement constraining [deleted] space defense systems were reached, as a [deleted].

Overall, the US and the USSR are [deleted]. The US space program tends to deploy a [deleted]

[deleted]. Therefore, US capability provided by space systems is [deleted].

Competition in ASAT systems would be costly to both sides. The Soviet [deleted] although it is [deleted]. Further, we believe that in the future, barring a [deleted] ASAT agreement, [deleted] and a capability to [deleted] satellites. The US [deleted] satellites. A US system [deleted]. On the other hand, the US would [deleted]. The US considers that a program [deleted] is not appropriate [deleted].

Although some measures can be taken to reduce satellite vulnerability, and some satellites are [deleted]

[deleted] at present because [deleted]. Limits placed on [deleted] but the [deleted] would be a critical factor. Some measures to improve satellite survivability [deleted] very expensive. Some survivability measures [deleted]. Some countermeasures could protect satellites from harassment or trivial interference and could make such actions difficult to [deleted]. This would tend to raise the threshold of [deleted] and could, therefore, raise the political risk of such actions.

An ASAT competition would pose a considerable threat to critical satellites on both sides, creating a situation in which neither side could rely with confidence on unprotected space systems [deleted]

[deleted].

2. Former ASAT Negotiations.

In March 1977, the US proposed to the Soviets the formation of a joint working group to discuss arms control limitations on anti-satellite systems. The first round of talks was held in Helsinki on June 8 - 16, 1978. The discussions were exploratory in nature to determine the possibility and basis for subsequent negotiations on limiting certain activities directed against space objects and systems for conducting such activities. US and Soviet delegations were convened in Bern, Switzerland on January 23 to February 16, 1979 and again April 23 to June 17, 1979 in Vienna to continue negotiations. The US proposed at that time [deleted].

At this time, the future of ASAT negotiations depends, in part, upon the results of the US ASAT policy review. No agreement would be acceptable that would either place the US in an inferior position vis-a-vis the Soviet Union or contain a non-verifiable position.

3. Issues for Consideration.

The definition of what comprises an ASAT system could have a bearing on other US space programs, to the extent that constraints on [deleted] system.

For example, [deleted] would provide the necessary [deleted] system. Since [deleted] now provides, and will continue to provide vital US capabilities to [deleted] programs, any constraint which inhibited the continued operation and improvement of this system would be detrimental to US space efforts. That [deleted] happens to [deleted] does not imply that is purpose is solely, or mainly, to perform that function. One US negotiating objective in any US-Soviet ASAT talks would be to avoid undesirable [deleted] space programs. [Deleted] and thus may complicate negotiations.

The Space Transportation System is designed to place payloads into earth orbit, inspect and repair compatibly engineered satellites in orbit [deleted] and retrieve US or other cooperative space systems [deleted] for return to earth. [Deleted].

[Deleted]

[deleted].

D. Effect on Global and Regional Stability.

It is believed that the likelihood of [deleted]. However, the likelihood of [deleted] at least initially.

A Soviet advantage in ASAT capability could contribute to strategic and regional instability. [Deleted].

The effects of ASAT deployments by both sides on strategic stability could be lessened by two factors. First, [deleted]

[deleted] satellite capabilities on either side probably would be degraded or negated in a major nuclear attack even in the absence of [deleted] because launch facilities and ground stations for satellite control and read-out could be high on the attack priority list. [Deleted]. Second, if one side were contemplating only a limited strike, there could be some incentive to spare satellites. An attack on some satellites in the absence of enduring or reconstitutable assets would make attack assessment and associated communications more difficult, and therefore might raise the risk of a massive, rather than a limited retaliation. Such an attack could also complicate post-attack communications between the two sides.

E. Technological Implications.

A US space defense program may have a technological impact on Soviet satellite and anti-satellite programs, but it appears unlikely that other countries with space programs would devote resources to anti-satellite development in the near future, or would have the incentive to do so even if they possessed the necessary technology.

While the present [deleted] is technically [deleted] relative to the [deleted] technology being developed [deleted] in the research phase. Each side currently has only a small number of critical operational satellites [deleted]. Although this number is expected to increase to perhaps [deleted] the number will still be relatively small. Therefore, [deleted] could have a [deleted] of US satellites.

To offset future US anti-satellite systems, the Soviets might elect to increase the [deleted] of their own satellites. The disadvantages to them would be similar to those of the US: added cost, [deleted] and the possibility that [deleted] might have only short term effectiveness.

The scope and pace of Soviet anti-satellite programs probably would depend on Soviet assessment of US ASAT and satellite survivability programs and of their ability to compete with the US in [deleted] system development. Depending on their estimates, the Soviets [deleted]. On the other hand, in the absence of [deleted]. In the latter case, they might attempt to: [deleted]

[deleted].

The Soviets might also combine [deleted] programs. Such a course could, in Soviet thinking, [deleted] during the SALT negotiations, and [deleted]. The SALT analogy could be somewhat limited, if the US goal were to [deleted] rather than (as in SALT II) to limit the numbers and capabilities of weapon systems. Hence, if the Soviets combined [deleted] they could risk forfeiting these improvements. They might also risk a sharper US reaction such as possible acceleration of US space defense programs, (including increased survivability measures for hardening of critical satellites and [deleted].

F. Potential Interaction with Other Programs.

The potential for use of [deleted] for space defense purposes is being followed in the Space Defense Systems Program. For example, the [deleted] program is actively investigating the potential application of [deleted].

DOD is also investigating defense against [deleted] of satellite components.

In the Strategic Technology/High Energy Laser Program (PE 62301E), described in Section IIE, DARPA has defined conceptually [deleted].

Advanced space technology which could provide the base for development of a [deleted] could also provide the necessary technology for an [deleted] system.** Because of this interrelationship, an agreement which [deleted] could also [deleted]

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* Additional details of the service and the DARPA directed energy programs are included in a separate ACIS entitled "Directed Energy Programs."

** The development, testing and deployment of sea-based, air-based, space-based and mobile land-based ABM systems and their components are prohibited by the ABM Treaty. It bans all deployment of ABM systems and components (missiles, launchers, and radars) beyond those allowed by Article III. Should ABM systems based on other physical principles and including components capable of substituting for ABM missiles, launchers, or radars be created in the future, limitations on such systems and their components would be subject to discussion in accordance with the ABM Treaty provisions for consultation and agreement, and/or amendment.

[deleted].

G. Verification.

The [deleted] agreement makes our ability to verify compliance with such an agreement particularly important. Preliminary studies indicate that [deleted] in the monitoring of such an agreement. [Deleted]. The preliminary judgement of the intelligence community is that, [deleted].

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* [Deleted].

A principle method of verifying a [deleted]. Thus, US monitoring capabilities [deleted]. Our ability to monitor [deleted] agreement is reached or not.

Some types of [deleted] systems (e.g., [deleted] could be [deleted].

The Soviets also may have concerns over the verification of limits on US [deleted] programs. They may be concerned that the US [deleted] they may have similar concerns as the US about the [deleted] that exist or might be developed for other purposes; and they may have comparable concerns about the use of [deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Since the Soviets currently possess an operational ASAT and the US does not, the arms control policy with regard to space defense is under review.

The US Space Defense program:

-- [deleted]

-- [deleted]

-- indicates US determination not to permit a Soviet anti-satellite system monopoly;

-- provides a [deleted] agreement is reached;

-- is subject to revision depending on decisions regarding ASAT negotiations;

-- is consistent with US obligations under the Outer Space Treaty, the UN Charter, the ABM Treaty, the International Telecommunications Convention, the Convention on Registration of Objects Launched into Outer Space, and the Direct Communications Link Modernization Agreement;

-- would not adversely affect other arms control negotiations;

-- [deleted]

-- [deleted]

[deleted

-- is not likely to lead to third-country development of anti-satellite systems; and

-- [deleted].

Preliminary studies suggest that some potential provisions of a [deleted] arms control agreement would [deleted] but could require [deleted] as significant cost.

BALLISTIC MISSILE DEFENSE

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
63304A	Advanced Technology Program (ATP)
63308A	Systems Technology Program (STP)

The Department of the Army is responsible for conducting a continuing research and development (R&D) program in ballistic missile defense (BMD)* within the constraints of the Anti-Ballistic Missile (ABM)* Treaty. The current US BMD R&D program is structured into two complementary and closely interrelated efforts, the Advanced Technology Program (ATP) and the Systems Technology Program (STP). These efforts are aimed at building the technological base, at both the component and systems level, to provide a wide range of options for possible strategic defense applications including the definition and demonstration of the defended options for MX basing included in President Reagan's Strategic Program.

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* ABM and BMD are used interchangeably. Generally, ABM is used when referring to the Treaty and BMD is used in the context of the existing US R&D program.

II. PROGRAM DESCRIPTIONS

Since the ABM Treaty was signed in 1972, the scope and direction of the BMD program have changed markedly. The SAFEGUARD System, undergoing deployment at that time, has been inactivated with the exception of the Perimeter Acquisition Radar (PAR) near Grand Forks, North Dakota.* (The PAR is now operated by the Air Force and used for SLBM early warning and ICBM attack assessment, though it remains an ABM radar for purposes of the ABM Treaty.) A follow-on BMD system prototype demonstration program was terminated in 1975. Also, 1975 saw the last US BMD interceptor flight tests. The current BMD program is aimed at reducing both the cost and the system development lead time, as well as improving the effectiveness of systems applicable to ICBM defense. Thus the program allows the US to keep abreast of advances in BMD technology while providing a hedge against possible Soviet ABM breakout. It also provides options for enhancing ICBM survivability and for defending other strategic targets. A pre-prototype demonstration program was initiated in 1980 and these efforts will be accelerated in FY 1983 in support of the overall Strategic Program.

A. Advanced Technology Program.

The Advanced Technology Program (ATP) is a broadly based research effort whose objectives are to provide the advanced technological foundation for future BMD concepts, emphasizing approaches which could yield fundamental breakthroughs in BMD capabilities, and to provide the technological base for substantial improvements in nearer-term BMD systems. Significant research projects underway in FY 1983 are described below. (For a discussion of potential BMD applications of directed energy technologies, see the arms control impact statement on Directed Energy.)

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* The system's components remain Treaty accountable unless dismantled in accordance with the agreed procedures for dismantling and destruction worked out in the Standing Consultative Commission.

One part of the ATP investigates advanced radar and optical sensors. Radar technology efforts emphasize increased resistance to nuclear blackout through use of shorter (millimeter range) wavelengths. Millimeter wavelength radars also promise improved resolution and greater accuracy in measuring target range, angle and velocity. In FY 1983, efforts to gather and analyze field test data would continue.

Efforts are also underway to define the potential of passive optics to detect and discriminate large numbers of objects in space. An optical data gathering device called the Designating Optical Tracker (DOT) that operates in the long-wave infrared (LWIR) part of the spectrum is in the process of being flown at Kwajalein. The DOT is launched by a sounding rocket and begins operating when it is above the atmosphere. Four tests have taken place (in December 1978, February 1980, September 1980, and June 1981); more are planned.

The Forward Acquisition Sensor (FAS) is another advanced development effort and is intended to investigate the use of a [deleted] in a BMD or early warning role. [Deleted]

[deleted]. The FAS concept is a part of the overall effort leading to an integrated Overlay capability in the Systems Technology Program (see below).

A derivative of the FAS effort is the proposed Survivable Optical Forward Acquisition System (SOFAS), an application of BMD technology to augment ballistic missile early warning and attack assessment capabilities. [Deleted].

B. Systems Technology Program.

The Systems Technology Program (STP) is concerned with the integration of promising new technologies, the testing of new techniques, the determination of solutions to technical issues critical to the successful operation of potential BMD systems, and the prototyping and demonstration of new BMD systems. The STP exploits advances and breakthroughs achieved by the ATP and, concurrently, addresses those aspects of BMD research that require integrated testing of components and subsystems in as realistic an environment as possible.

The current thrust of the BMD STP effort is focused on two principal defense system concepts, Low Altitude Defense (LoAD) and Overlay defense. Both concepts, either individually or combined in a layered defense, offer options for improving US ICBM survivability and for countering continued Soviet threat growth. These concepts are described in the following paragraphs.

1. Low Altitude Defense (LoAD).

The LoAD effort is an accelerated pre-prototype demonstration program to support concepts for defense of hardened strategic targets. The original schedules called for Phase I of the LoAD pre-prototype demonstration (PPD) program, to validate the radar, data processor, and interceptor technology to be completed in [deleted]. As a result of [deleted].

[Deleted]. In addition, the development schedules for the major subsystems will also proceed on essentially the same schedule. There are activities which were required under the MX/MPS option, such as parallel MX and LoAD design, interface configuration control and development of the defense unit platform, that are no longer required. However, under the fixed silo defense option it will be necessary to [deleted].

2. Exoatmospheric Overlay Defense.

The STP has in recent years been investigating the potential of a multi-tiered, or layered, approach to ICBM defense. The high-altitude component, or overlay, in this conceptual system would feature long-range interceptors with non-nuclear warheads and optical, terminal-homing guidance systems to make exoatmospheric intercepts. Candidates for the low-altitude component include LoAD or other advanced terminal defense systems.

In a conceptual tactical configuration for an overlay system, a probe would be launched upon receipt of attack warning from a forward acquisition means such as ground-based early warning radars or satellite-borne infrared sensors. Optical sensors aboard the probe would acquire and track the threat complex and pass track data through a battle manager for assignment of interceptors. Each Overlay interceptor missile would be equipped with one or more small "kill vehicles" that [deleted] reacquire the specific reentry vehicles for intercept and non-nuclear kill (NNK). Current studies for the overlay system are being directed toward both the near-term threat and the more sophisticated far-term threat [deleted].

The Homing Overlay Experiment (HOE) is designed to resolve key development issues associated with exoatmospheric NNK and optical guidance and to demonstrate the intercept capability of a single kill vehicle using a LWIR terminal guidance system. The final two of four planned tests of the experimental HOE flight vehicle will take place at Kwajalein [deleted].

III. STATED MILITARY REQUIREMENTS

The scope of work outlined in the two complementary efforts within the overall US BMD R&D program has been structured to meet stated requirements and objectives, within the terms of the ABM Treaty: (1) to develop advanced BMD concepts, technology, and components to insure a technological capability to counter future ballistic missile threats, and (2) to continue to validate, in a systems context, BMD components which can be deployed for a variety of missions including defense of MX. Other objectives of the program include providing assistance in the evaluation of US strategic offensive forces and the assessment of Soviet BMD activity.

The US BMD R&D effort is largely motivated by the threat posed by growing Soviet ICBM counter-silo capabilities and by the USSR's own continuing BMD development activities. The Soviets continue to deploy an improved ICBM force and to proceed with the development of new or modernized ICBMs. [Deleted].

Although the intelligence community continues to believe it unlikely that the Soviets will opt in the near term [deleted].

Although the [deleted]

[deleted].

[Deleted].

[Deleted].

[Deleted]

[deleted].

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion
Advanced Technology (63304A)					
Development $	1378.9	126.5	143.2	[deleted]	Continuing
Production $	N/A	N/A	N/A	[deleted]	N/A
Systems Technology (63308A)					
Development $	1080.6	335.6	727.3	[deleted]	Continuing
Production $	N/A	N/A	N/A	[deleted]	N/A

Funding for BMD for FY 1982 and following years reflects the increased emphasis being placed on system development and the reduction of deployment leadtimes.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

A US BMD R&D program conducted within the terms of the ABM Treaty supports US arms control policy by keeping the US abreast of BMD technologies, thereby hedging against, and at the same time serving to discourage, any possible Soviet breakout from the ABM Treaty. It also provides future system deployment options, as announced by President Reagan, should the US conclude that this would be in its interest.

B. Relation to Arms Control Agreements.

The ABM Treaty is an agreement of unlimited duration which restricts ABM deployments and limits certain areas of ABM development.* The objectives of the Treaty are to curb the race in strategic defensive arms and to reduce thereby the incentive to increase the number or capabilities of offensive systems. The Treaty, which put a ceiling on ABM deployments, facilitated conclusion of the Interim Agreement limiting the number of fixed ICBM launchers and submarine-launched ballistic missile (SLBM) launchers on each side. The United States continues to be a party to the ABM Treaty. The Treaty is scheduled for review and a meeting will be held with the Soviets for this purpose sometime after October 3, 1982. The US Government's own extensive review of the Treaty will be completed prior to this meeting.

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* Like other arms control treaties signed by the US, the ABM Treaty makes provision for withdrawal (in this case, upon six months notice) should either party decide that extraordinary events related to the subject matter of the Treaty have jeopardized its supreme interests.

The ABM Treaty (as amended by the Protocol to the Treaty which was signed on July 3, 1974, and entered into force on May 24, 1976) permits each Party to have one limited ABM system with no more than 100 ABM launchers and no more than 100 ABM interceptor missiles at launch sites. This limited system may be deployed either within an area having a radius of 150 km and centered on the Party's national capital; or within an area at least 1300 km from the national capital, having a radius of 150 km and containing ICBM silo launchers. The US elected to deploy an ABM system centered on the ICBM field at Grand Forks. This system is no longer operational. The Soviets elected to deploy an ABM system centered on their national capital at Moscow. This system, [deleted] continues to be operational [deleted]. A Party may exchange its ABM system deployment area on the basis of the Protocol to the ABM Treaty of July 3, 1974, and in accordance with the procedures agreed upon in the Supplementary Protocol of October 28, 1976.*

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* The full title of this instrument, which was negotiated in the Standing Consultative Commission (SCC), is "Supplementary Protocol to the Protocol on Procedures Governing Replacement, Dismantling or Destruction, and Notification Thereof, For ABM Systems and Their Components."

The ABM Treaty allows the development* and testing of fixed, land-based ABM systems and components at agreed test ranges (Article IV), but prohibits (Article V) the development, testing, or deployment of sea-based, air-based, space-based, or mobile land-based ABM systems or components, and the development, testing, or deployment of ABM interceptor missiles with more than one independently-guided warhead, launchers for launching more than one ABM interceptor missile at a time from each launcher, or automatic, semi-automatic, or similar systems for rapid reload of ABM launchers.

While the Treaty allows development and testing of fixed, land-based ABM systems or components based on other physical principles (such as lasers or particle beams) and including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, such systems or components may not be deployed under the terms of Article III and an agreed statement in connection with Article III, unless specific limitations on such systems and their components are discussed and agreement is reached to amend the Treaty.

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* The meaning of the term "development," as used in the ABM Treaty, is as follows:

> "The obligation not to develop such systems, devices or warheads would be applicable only to that stage of development which follows laboratory development and testing. The prohibitions on development contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or bread-board model." (As provided by Ambassador Gerard Smith to the Senate Armed Services Committee during its hearings concerning ratification of the ABM Treaty. For a more complete discussion, see Senate Armed Services Committee, Hearings on the Military Implications of the Treaty on the Limitation of Anti-Ballistic Missiles and the Interim Agreement on Limitation of Strategic Offensive Arms, 92nd Congress, 2nd Session, July 18, 1972, p. 377.)

The FY 1983 US BMD research and development program is consistent with the ABM Treaty. The program elements described in section II, above, will continue to be monitored to ensure their compliance with the terms of the Treaty.*

The existence of a BMD research and development program within the terms of the ABM Treaty, as a base from which a BMD system could be developed and deployed, contributes to the continued viability of the Treaty and to a favorable strategic negotiations environment by providing a hedge against Soviet abrogation of the ABM Treaty. In this sense, the US BMD program provides a disincentive for Soviet abrogation of the Treaty.

C. Effect on Current and Prospective Negotiations.

The next five-year review prescribed in the ABM Treaty will be held sometime after October 3, 1982, and the US is now formulating its position. At the previous review in 1977, the US and USSR reaffirmed their respective support for the Treaty. (Any substantive questions that arise regarding the ABM Treaty, including proposed amendments, may, of course, be raised at any time in the Standing Consultative Commission (SCC) established by Article XIII of the Treaty.) The FY 1983 US BMD R&D program should have no effect on other current and prospective arms control negotiations. [Deleted].

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* For a discussion of the relationship of the ABM Treaty to systems developed for applications other than ballistic missile defense, see the arms control impact statements on Space Defense and Directed Energy.

D. Effect on Global and Regional Stability.

Mutual adherence to the ABM Treaty by the US and USSR serves to enhance the deterrent for the US and its allies. A continuing US R&D program within the terms of the ABM Treaty enables the US to keep abreast of advances in BMD technology and thereby reduces the possibility of the Soviet Union gaining a meaningful advantage in BMD technology. Absent the US BMD R&D program, the prospects for Soviet advantage in BMD technology, or perceptions of Soviet advantage, could be increased with attendant negative implications for global and regional stability.

The FY 1983 BMD program has no perceptible effects on such issues as the nuclear threshold, crisis stability, escalation, collateral damage and aftermath effects, or the risk of accidental war, and hence is not destabilizing on any of these grounds.

E. Technological Implications.

As noted above, US BMD R&D helps reduce the risk of Soviet technological surprise in the BMD area. The BMD program also assists in the design and evaluation of US strategic offensive systems by contributing information on their penetrativity, and by furthering technological assessments of current and projected Soviet BMD capabilities. By making possible greater confidence in our understanding of the potential of BMD technologies, this program supports continued US adherence to the ABM Treaty, or, if necessary, helps identify those technologies and systems for which a Treaty amendment might be appropriate.

F. Potential Interaction with Other Programs.

BMD programs can interact with strategic offensive ballistic missile programs in two ways. BMD research will provide the technological base from which a system to defend ICBM sites could be developed to support a Presidential decision on deployment. A deployment decision could convince a potential attacker that any offensive buildup designed to produce a disarming first-strike capability against ICBMs would be pointless. On the other hand, ABM deployments could stimulate an offense-defense competition, including the development and deployment of advanced penetration aids and maneuvering reentry vehicles for offensive forces, as well as increases in force levels, giving each side, in turn, an incentive to further improve the capabilities of its ABM systems.

The provisions of the ABM Treaty limit all strategic ABM defenses including those with the sole purpose of defending offensive missiles such as ICBMs. The US BMD R&D program, as currently constituted, will provide the technological base (as permitted by the Treaty) for an ABM system. Thus it provides a hedge against Soviet violation or abrogation of the ABM Treaty, without providing a direct impetus for the Soviets to increase their strategic offensive forces.

A future US BMD system, if deployed, could perform the unique function of defending against ballistic missile attack. Although not optimum for negating satellites in low earth orbit, a non-nuclear BMD system capable of high-altitude intercepts could have some of the capabilities needed to negate such satellites.

G. Verification.

[Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The FY 1983 US Ballistic Missile Defense program is consistent with the ABM Treaty and supports US arms control and national security policy. It is consistent with current and prospective arms control negotiations. The program is designed to: (1) avoid technological surprise, (2) provide deployment options as a hedge against Soviet violation or abrogation of the ABM Treaty, (3) improve the potential for US ICBM survivability, and (4) provide deployment options as a hedge to counter Soviet threat growth. It also supports our ability to assess the capabilities of US ICBMs and SLBMs to accomplish their strategic deterrent missions.

The BMD program currently has no adverse arms control impact.

INTERMEDIATE-RANGE NUCLEAR MISSILE SYSTEMS AND THE SEA-LAUNCHED CRUISE MISSILE

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
64311A	PERSHING II (PII)
DOE Program	W85 PERSHING Warhead
Army Procurement	PERSHING
64362F	Ground-Launched Cruise Missile (GLCM)
Air Force Procurement	GLCM Missile
DOE Program	W84 GLCM Warhead
64367N	TOMAHAWK Missile System
Navy Procurement	TOMAHAWK Missile System

On December 12, 1979, Foreign and Defense Ministers from each of the participating members of NATO agreed on a program for the modernization of NATO Intermediate-Range Theater Forces (INF).

The systems involved in this agreement are the PERSHING II (PII) and the Ground-Launched Cruise Missile (GLCM). In view of the close relationship these systems will share in the further development of the NATO INF Modernization Program, they are discussed together in this ACIS.

There have been no significant programmatic changes in either the PII or GLCM programs. A discussion of these programs is included this year because of the high level of interest in INF here and in Europe and the implications of INF modernization for US negotiating policy.*

The land-attack, sea-launched cruise missile is also discussed in this ACIS. As part of the President's overall package of strategic modernization initiatives, SLCM will be deployed on ships and submarines to expand and strengthen US world-wide sea-based forces. Although the roles and rationale for SLCM deployment are different from those of GLCM, the physical similarities of the two missiles raise a number of related arms control issues. Additionally, the initiation of a Vertical Launch System (VLS) program has the potential to change significantly the arms control implications attendant to SLCM deployment.

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* The term "Intermediate-Range Nuclear Forces" (INF) was introduced by the US as preparations were underway to begin negotiations with the Soviet Union in November 1981. Nuclear systems below intercontinental range but above the range of systems designed for use on, or in direct support of, the battlefield are in the INF category (e.g., GLCM, PII, SS-4, SS-5, and SS-20). The previous term, "Long-Range Theater Nuclear Forces" (LRTNF) was shifted to more clearly reflect the scope of negotiations and to dispel the idea that the US viewed Europe as a "theater" of nuclear conflict distinct from the US. NATO has not yet fully adopted the shift to the term INF.

While the cruise missile systems discussed in this statement are capable of accommodating conventional warheads -- and indeed, in the case of SLCM, development of such applications is underway -- primary emphasis in this ACIS is on their nuclear capabilities and the contribution of PII and GLCM to NATO defense. INF will help to correct the current military imbalance in Europe, thereby strengthening NATO's deterrent capability. SLCM enhancements will contribute to the revitalization of the US strategic force posture by providing a secure strategic reserve force. INF also have implications for bilateral and multilateral arms reduction talks.

II. PROGRAM DESCRIPTIONS

A. PERSHING II.

1. Capabilities.

The PII, a land-mobile ballistic missile system, is a major improvement over the currently fielded PIa system. As currently envisioned, the PII will be armed only with nuclear warheads.

PERSHING Ia is currently deployed in Europe with both US Army units and units of the Air Force of the Federal Republic of Germany (FRG). [Deleted].

The PII system will employ a new missile and reentry vehicle (RV) as well as a modified version of the present erector/launcher and other ground support equipment. This upgraded ground support equipment would result in improved command and control and reduced response times and manpower requirements. The PII missile differs from its predecessor primarily by providing increased range and accuracy.

The PII has a maximum range of [deleted] compared to the current system's maximum range of approximately [deleted]. The range improvement, coupled with deployment [deleted].

The PIa RV utilizes the W50 [deleted]. PERSHING II is being designed to carry the W85 air burst/surface burst warhead. The W85 will have [deleted]. Higher accuracy allows the use of lower yields for a given mission with the PII, thereby reducing potential collateral damage.

Expected improvements to the PERSHING force resulting from the introduction of PII with its greater range, accuracy, [deleted] should help maintain current damage expectancies in the face of on-going Warsaw Pact/Soviet Union efforts to harden critical fixed theater targets. In particular, the Warsaw Pact has stressed emplacing earth covered concrete shelters ("hangarettes") on airbases, as well as concrete revetments to protect aircraft. Additionally, some command, control, and communications and nuclear storage sites in Eastern Europe have been hardened.

PII's pre-launch survivability, like that of the present

PIa, stems from its mobility. While deployed at peacetime QRA sites and kasernes, [deleted].

PII's in-flight survivability, like that of PIa, stems from the high speed of the reentry vehicle. Development and deployment of an anti-tactical ballistic missile (ATBM) system would be required to reduce PII's effectiveness once launched. It should be noted that [deleted].

2. Program Status.

The PII program, initiated in FY 1975, is in the engineering development phase. A production decision is scheduled for FY 1982. The program is structured to provide an initial operational capability (IOC) in Europe in December 1983. The projected deployment completion date is December 1985. Conversion of existing US PIa launchers and replacement of existing US PIa missiles and warheads is planned on a one-for-one basis.

Long lead DOD procurement for the production phase will commence early in FY 1982. During FY 1983, the engineering development (ED) phase will culminate with the completion of the DT/OT missile flights and the second production buy will occur.

B. Ground-Launched Cruise Missile (GLCM).

1. Capabilities.

The Ground-Launched Cruise Missile will be a variant of the TOMAHAWK cruise missile adapted for launch from air-transportable, ground-mobile platforms. The GLCM is 219 inches long and is powered by a turbofan engine. Guidance is by inertial navigation with terrain contour matching (TERCOM) updates at periodic intervals. It flies at subsonic speeds at low altitude. Its odometer range would be [deleted] to fuel exhaustion with relatively high terminal accuracy. The missiles will be transported four to a transporter-erector-launcher (TEL) and controlled from a launch control center (LCC). Four TELs, with sixteen missiles, and two LCCs constitute a fire control unit. The design of the launch control van, TEL, and associated electronics constitute the bulk of the program. System integration and testing make up the balance of the effort.

GLCM deployment in the European theater will begin in 1983. Its expected accuracy, ability to penetrate air defenses, pre-launch survivability, [deleted] will permit GLCM to destroy hard targets as well as attack soft targets effectively with relatively limited collateral damage. Consequently, the GLCM offers the prospect of helping to maintain current damage expectancies in the face of Warsaw Pact initiatives to make their fixed theater targets, such as hardened aircraft shelters, less vulnerable. GLCM's relatively long time-of-flight, however, would reduce its utility against long-range time-urgent targets.

The warhead planned for use with the GLCM is the W84. [Deleted].

The pre-launch survivability for the GLCM, like the PERSHING II, derives from the system's mobility. While deployed at permanent sites, the GLCM would be [deleted]. The GLCM should be [deleted]. GLCM's relationship to command and control systems would be analogous to those which exist for PERSHING missiles and tactical aircraft.

2. Program Status.

The GLCM is currently in full scale engineering development. Full system testing will begin in [deleted] using preproduction prototype missiles, TELs, and launch control centers. Development of the Integrated Logistics Support System continues along with development of the training program. DSARC

III is scheduled for [deleted]. The IOC for GLCM is [deleted]. Current plans are to procure 560 GLCMs -- 464 nuclear-armed GLCMs for unit equipment, and 96 GLCMs for tests, training, and replacements.

During FY 1978, DOD requested DOE to initiate Phase 3 Development Engineering for the W84 warhead. The required IOC is [deleted].

C. Land-Attack Sea-Launched Cruise Missile (SLCM).

1. Capabilities.

The TOMAHAWK sea-launched land-attack cruise missile (TLAM), also a derivative of the TOMAHAWK Cruise Missile, is being developed with a conventional capability for both land- and ship-attack and a nuclear capability for land-attack. While PII and GLCM are oriented toward NATO requirements, the TLAM is being developed to satisfy US requirements worldwide. The TOMAHAWK missile is sized to fit the standard 21 inch torpedo tube and is capable of being deployed aboard a variety of surface ships and submarines. Its system characteristics are essentially identical to those of the GLCM as discussed above.

Deployed aboard submerged attack submarines, the SLCM would be virtually undetectable prior to launch. Moreover, once launched, [deleted]

[deleted]. The land-attack SLCM will also be deployed, along with anti-ship SLCMs, on 637 and 688 class SSNs. Up to eight SLCMs could be deployed per SSN, with a mix of variants determined by the fleet commander based on the mission assignment. A Vertical Launch System (VLS) has been initiated which could provide submarines of the SSN 688 class with the capability to store and launch up to 12 TOMAHAWK Cruise Missiles (either land-attack or anti-ship) from vertical launch tubes without degrading the SSN's primary mission.

Deployed aboard attack submarines, command and control of nuclear land-attack SLCMs would be analogous to that exercised for the POSEIDON SLBMs.

SLCMs will also be deployed on surface ships, including cruisers and SPRUANCE class destroyers, each of which could normally carry a mix of [deleted] anti-ship and land-attack missiles. The Navy has funded a battleship refit program which would enable these ships to accommodate [deleted]. When deployed aboard surface ships, command and control of nuclear SLCMs would be similar to that exercised for [deleted].

2. Program Status.

The program to develop and test a sea-launched cruise missile was initiated in 1972. Operational testing and evaluation of the submarine-launched conventional land-attack version began in October 1981 and is scheduled to be completed in November 1982. The ship-launched version is scheduled to undergo similar testing during the the period April through September 1983. Procurement of conventionally-armed land-attack and anti-ship missiles began in FY 1980. The IOC currently established for the submarine-launched conventional land-attack SLCM is early CY 1982. The IOC for surface ship conventional land-attack and anti-ship missiles is programmed for FY 1983. The IOC for the TLAM/N is scheduled for [deleted].

III. STATED MILITARY REQUIREMENTS

The Warsaw Pact has deployed a variety of theater nuclear forces. These include the SS-20 long-range TNF ballistic missile, the medium-range SCALEBOARD and SCUD, as well as the [deleted]. In addition, the SCALEBOARD is now being replaced by the SS-22. They also have deployed large numbers of tactical aircraft in Eastern Europe and the Soviet Union with nuclear delivery capabilities. Additionally, the Soviet Union has deployed sea-based ballistic and tactical cruise missiles and, in Soviet territory, the SS-4 medium-range ballistic missile (MRBM) and SS-5 intermediate-range ballistic missiles (IRBM) as well as manned bombers. They [deleted]. In particular, the deployment of the SS-20 IRBM and BACKFIRE bomber has raised concerns within NATO about the adequacy of the Alliance's intermediate-range nuclear forces.

A. NATO INF Modernization.

Improvements to NATO theater nuclear forces would provide more survivable, credible, and effective military options linking NATO's conventional and shorter-range theater nuclear systems to the US strategic force. Deployments of longer-range INF missiles could lessen any Soviet doubts about the US strategic guarantee to NATO and help to alleviate concerns on the part of the Allies regarding Soviet force modernization by closing real or perceived gaps in the escalatory ladder. INF deployments by NATO are planned to be of a size and character so as to preclude perceptions of decoupling, while at the same time serving to deter a Warsaw Pact attack on Western Europe. Should deterrence fail, the US and its NATO Allies would possess effective new capabilities to engage military targets located well behind the forward edge of the battle area.

Current US theater nuclear systems capable of engaging significant fixed "rear-area" theater targets are:

- the PERSHING Ia ballistic missile
- dual-capable aircraft
- POSEIDON reentry vehicles committed to NATO

Additionally, the United Kingdom possesses POLARIS missiles and VULCAN aircraft capable of engaging these targets. (The VULCAN is being phased out beginning in 1981.)

Deployments of PII and GLCM to supplement or replace existing NATO theater nuclear systems promise to enhance current capabilities in six broad respects. First, they could provide NATO a modernized capability to strike targets on Soviet territory from Western Europe and thus strengthen the NATO deterrent against attack of Western Europe from Soviet territory as discussed above. Second, each of the proposed programs would offer increased accuracy and allow targeting of previously untargeted hard targets. Third, given their accuracy both would permit the use of lower yield nuclear weapons to attain the desired military effects thus permitting some reduction of collateral damage. Fourth, augmenting dual-capable aircraft with PII and GLCM potentially offers greater prelaunch system survivability under conditions of either conventional or nuclear attack. Fifth, cruise missiles may be more survivable than manned airborne platforms in the dense air defense environment that would characterize warfare in Europe. Sixth, by having available more capable nuclear missile systems of longer range on alert to cover preplanned fixed targets, some quick reaction alert aircraft could be available for other nuclear or conventional roles.

Central to the deterrence of conflict, and to defense should deterrence fail, is the preservation of a range of options in the event of aggression. The availability of a graduated escalatory ladder enhances deterrence by raising the possibility that aggression at any one level of conflict might either be matched in kind or escalated. Deployments of PII and GLCM add a new dimension to the variety of response options below the strategic level. This helps to insure the linkage between lower response options and the strategic nuclear forces and in so doing makes an effective NATO response more credible.

B. Land-Attack SLCM.[*]

The land-attack SLCM is being developed with a view toward unique US requirements worldwide which are distinct from the NATO requirements for PII and GLCM. A land-attack SLCM would provide a survivable, credible, and effective military option on a worldwide basis. These accurate weapons would use warheads designed to destroy the target while at the same time minimize collateral damage.

Manned aircraft are the primary delivery vehicle of conventional ordnance to strike targets on interdiction and deep strike missions. The technology advancement offered by the land-attack TOMAHAWK program would enable the accurate delivery of conventional ordnance to long-range targets thus complementing manned aircraft.

The Navy has a variety of potential conventional land-attack roles in the conduct of its missions of sea control and power projection. In the sea control context, these roles include [deleted]. The Navy's current land-attack force consists of carrier-based A6 and A7 aircraft armed with iron bombs and precision guided munitions (PGMs). TLAM/C would both supplement and complement these carrier aircraft.

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[*] Also called the TOMAHAWK land-attack missile (TLAM).

As complements to carrier air, TLAM/Cs could degrade enemy air defenses thereby clearing attack corridors for the sea-based aircraft.

The Navy's [deleted].

Deployment of [deleted].

IV. FUNDING ("then year" $ in millions)

			FY 81 & Prior	FY 82	FY 83	FY 84 (est.)	FY 85 to Completion	Total Dev.	Total Prod.	Total Const.	Total Units	Unit Cost	Total Program Cost
PERSHING II Missile System						[							]
	PE 64311A	Development	$ 388.1	150.6	113.3								
		Production	$ 2.3	221.6	508.6								
PERSHING II Warhead													
	W85	DOE Development	$[deleted]	[deleted]	[deleted]								
		Production	$[deleted]	[deleted]	[deleted]								
PERSHING Ia Missile System													
		Production	$ 746.5	-	-				Deleted				
Ground-Launched Cruise Missile System													
	PE 64362F	Development	$ 179.1	80.1	28.6								
		Production	$ 192.5	350.5	530.7								
		Construction	$ 23.1	75.0	85.4								
GLCM Warhead													
	W84	DOE Development	$[deleted]	[deleted]	[deleted]								
		DOE Production	$[deleted]	[deleted]	[deleted]								
TOMAHAWK Missile System													
	PE 64367N	Development	$ 892.4	120.0	72.3								
		Production	$ 205.6	236.3	308.4								
		Construction	$ 0	0.5	-	[							

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The missile and related warhead programs covered by this ACIS are consistent with US arms control policy. In the absence of international agreements to reduce nuclear stockpiles, there is a need to retain and modernize theater nuclear capabilities, especially those such as PII and GLCM which support NATO's strategy of flexible response.

The NATO decision to modernize its longer-range INF missile force was taken in response to the rapid and steady build-up of SS-20 missiles and BACKFIRE bombers. Both systems represent significant qualitative improvements over older Soviet systems, and were deployed during a period of declining NATO INF capability. For example, since 1977 the Soviets have already deployed some 250 SS-20 launchers (about 175 of these are deployed opposite NATO Europe) and their deployment is continuing. These deployments are in addition to 350 SS-4 and SS-5 launchers still fielded, all of which are also deployed against Europe. Further, the SS-20 design is tremendously advanced over the fielded SS-4s and SS-5s: its range is somewhat greater than that of the SS-5 and more than twice that of the SS-4; it is significantly more accurate than both the SS-4 and SS-5; and instead of a single one megaton warhead, it has three MIRVed warheads, [deleted]. The SS-20 is also more mobile and, therefore, more survivable than its predecessors. Additionally, the Soviets are developing long-range cruise missiles.

The NATO INF modernization program as reflected in the Integrated Decision Document [deleted] but seeks to ensure that NATO forces present a credible deterrent which preserves undiminished the security of the Alliance. The Integrated Decision Document which sets forth NATO's 1979 decision states that:

[Deleted].

In addition, as an integral part of their TNF modernization decision, Ministers further agreed, based on Alliance consideration, on a withdrawal of 1,000 US nuclear warheads from Europe as a step in the rationalization of the Alliance's nuclear force posture. The withdrawal was completed in 1980. This NATO position should [deleted]. However, much of the [deleted] will depend not only upon the pace and scope of US programs, and how these programs [deleted]

[deleted].

The US is committed to both tracks of NATO's 1979 decision, namely force modernization and negotiation. After a period of intensive consultation with its Allies, the US began INF negotiations with the Soviets on November 30, 1981 in Geneva Switzerland. The US will continue consultations with its Allies during the course of these negotiations.

B. Relation to Arms Control Agreements.

1. Non-Proliferation Treaty.

Article VI of the Non-Proliferation Treaty to which the US, USSR, and 114 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to foreswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As indicated above, INF arms control negotiations between the United States and the Soviet Union began on 30 November 1981.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

It is possible that US (or Soviet) programs could be cited by some governments as convenient rationalizations for building their own nuclear weapons. It must be noted, however, that many important non-nuclear-weapon countries are US allies that rely on the US nuclear arms umbrella and look upon US nuclear modernization as essential. Insofar as these countries are concerned, US nuclear modernization could inhibit proliferation.

In any case, unilateral US restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

2. SALT II Agreement.

The SALT II Treaty, which was to have run through 1985, was signed in June 1979, but has not been ratified. A comprehensive interagency review of US strategic arms control policy is currently under way. While it is the position of this administration that the SALT II Agreement will not be ratified in its present form, the US has indicated that, pending completion of this review, it will take no action that would undermine the SALT II Agreement as long as the Soviets exercise the same restraint.

The PII is not constrained by any arms control agreement to which the United States currently is a party. The SALT II Protocol, which was to have expired on December 31, 1981, would have prohibited the deployment of cruise missiles capable of ranges in excess of 600 kilometers on ground-based and sea-based launchers during the period of the Protocol. However, the development and testing of long-range (over 600 km) cruise missiles from sea-based or ground-based launchers was permitted as long as they were not equipped with multiple independently targetable warheads. Thus, GLCM and SLCM were not impeded by the Protocol, since they will not have multiple independently targetable warheads and the length of necessary developmental steps would have precluded their deployment prior to the expiration of the Protocol. The Protocol limitations would have expired with the Protocol and set no precedent for future negotiations.

3. LTBT/TTBT.

Development and deployment of warheads for longer-range INF missiles and SLCM missiles would not be affected by the Limited Test Ban Treaty which prohibits weapons tests in the atmosphere, in outer space, and under water.

The terms of the Threshold Test Ban Treaty (signed but not ratified) limit the United States and the Soviet Union to nuclear tests of no more than 150 kilotons of explosive yield. [Deleted].

C. Effect on Current and Prospective Negotiations.

Deployments of land-based LRTNF longer-range INF missiles and SLCM must be assessed in light of current arms control negotiations. Additionally, these weapon systems have implications for negotiations concerning theater nuclear systems.

1. MBFR Negotiations.

[Deleted].

2. CTB Negotiations.

The US has been engaged in Comprehensive Test Ban Treaty (CTBT) negotiations with the UK and the USSR. These negotiations were recessed in November 1980 without setting a resumption date. All nuclear test limitations are currently under US Government review. Any limitations agreed to subsequent to the [deleted].

Planned development testing of the [deleted] and the nuclear development testing of the [deleted]. However, [deleted].

3. Negotiations on Intermediate-Range Nuclear Forces.

Soviet deployments of new and modernized long-range theater nuclear systems -- in addition to their direct military significance -- have affected the NATO Alliance's perceptions with respect to the adequacy of NATO's present theater nuclear posture. As a result, following detailed analysis and consultation in the Alliance, NATO Foreign and Defense Ministers agreed in December 1979 on a program for the modernization of NATO LRTNF involving the deployment of 108 PERSHING II launchers and 464 GLCMs. At the same time, NATO agreed to pursue a parallel and complementary arms control approach for negotiations involving TNF within the SALT framework. This arms control approach would seek equal and lower levels of INF on both sides.

In December 1979, NATO Foreign and Defense Ministers, noting the special importance of negotiations involving INF for the overall security of the Alliance, also agreed to the constitution of a high level special consultative body within the Alliance to support US negotiating efforts. This body, the Special Consultative Group (SCG), was established on January 24, 1980, and has met frequently since.

In developing and pursuing a policy on arms control involving TNF in parallel with the preparation and implementation of the Alliance decision on the modernization of INF, [deleted]

[deleted].

The first proposal to discuss INF was made shortly after the December 1979 TNF decision when the [deleted]. In May 1981 the Allies reaffirmed their December 1979 resolution to pursue TNF arms control negotiations while moving ahead with NATO modernization.

After extensive consultation with its NATO allies, the US began INF negotiations with the USSR on 30 November 1981. The US delegation presented and elaborated on the proposal announced by the President on 18 November 1981. Under this proposal the Soviet Union would remove and dismantle the SS-20 and retire the SS-4 and SS-5 systems in return for US cancellation of plans to deploy PERSHING II and GLCM. The President also indicated a willingness to seek subsequent limits with significant reductions for other nuclear weapons systems and pledged that the US will negotiate in good faith to achieve global, equal and verifiable levels of weapons.

The impact of TLAM/N on INF arms control is [deleted].

[Deleted]

[deleted].

[Deleted].

While the penetrativity of the cruise missile does not equal that of a ballistic missile, the wide variety and number of ships currently being considered as potential launch platforms create for the Soviet Union a potent nuclear threat which is both highly mobile and, in total, difficult to detect. Further, when the US [deleted] and if future negotiations lead to limits on central systems and on land-based TNF missiles, the Soviets may not agree to exclude SLCMs permanently from limitations -- unless they wish to exclude their own SLCMs (or BACKFIRE) from limitation.

D. Effect on Global and Regional Stability.

The contribution of longer-range INF missile modernization to stability at the global or regional level seems to depend upon five sets of interrelated factors: (1) the Soviet/Warsaw Pact buildup of conventional and nuclear forces; (2) the characteristics of the new longer-range INF missile systems themselves; (3) the pace and scope of INF deployment; (4) Soviet perceptions of US longer-range INF missiles and Soviet technological responses to their deployment; and (5) the perceptions of our allies of US longer-range INF missile modernization. Each set of factors is discussed in turn below but throughout the discussion it is important to remember that the factors are interrelated. The relative importance one assigns to one particular set, vis-a-vis the others, will affect overall judgments about whether TNF modernization is stabilizing or destabilizing.

1. Soviet Threat.

The Warsaw Pact has over the years developed a large and growing capability in nuclear and conventional systems that directly threaten Western Europe and have a strategic significance for the Alliance in Europe. This situation has been especially aggravated over the last few years by Soviet decisions to implement programs modernizing and expanding substantially their long-range nuclear forces. In particular, they have deployed the SS-20 missile, which offers significant improvements over previous systems in providing greater accuracy, more mobility, and greater range, as well as having multiple warheads, and the BACKFIRE bomber, which has a much better performance than other Soviet aircraft deployed hitherto in the peripheral role. During this period, while the Soviet Union has been reinforcing its superiority in INF both quantitatively and qualitatively, Western INF capabilities have remained static. At the same time, the Soviets have also undertaken a modernization and expansion of their shorter-range TNF and greatly improved the overall quality of their conventional forces.

2. System Characteristics and Deployments.

Official NATO and US strategy is flexible response, the ability to respond appropriately to any level of aggression, and to escalate as necessary to deter or defeat aggression against NATO. The longer-range missile modernization program recently approved by NATO will improve the credibility of NATO TNF in the face of Warsaw Pact theater nuclear force modernization and, consequently, can be viewed as strengthening regional and global stability. Moreover, since it is US and NATO policy that modernization of theater systems should not take precedence over modernization of conventional forces, there will be no increased dependence on nuclear weapons resulting from such deployments.

[Deleted]

[deleted]. Consequently, the credibility of NATO nuclear options would be strengthened. [Deleted].
These systems like other US/NATO systems would be designed to operate according to clearly established command and control procedures [deleted].

Additional factors affecting stability and deterrence with the introduction of the PII, GLCM and SLCM systems are their ranges, flight times, the numbers deployed, and survivability:

- The cruise missile's range is a significant factor from a military standpoint and could be from an arms control point of view as well. [Deleted]. (Of course, flown to lesser ranges from the various possible base areas, cruise missiles could strike targets [deleted]).

- The relatively slow flight of current generation cruise missiles should not represent an increased first-strike threat to the Soviet Union. Rather, cruise missile deployments symbolize a second-strike capability which should have a stabilizing effect.

- Cruise missiles are difficult to detect and have the ability to change direction. This could result in Warsaw Pact misassessment of the attack origin, size, and intended targets, possibly provoking a disproportionate Soviet response.
- [Deleted].

Stability and deterrence will be affected by other factors as well. PERSHING, for example, [deleted].

3. Soviet Responses.

While modernized US TNF contribute to stability in many respects, assessment of their net effect on stability also must incorporate potential Soviet reactions during peacetime.

The USSR might react to the prospective increase in NATO's longer-range INF missile capabilities with additional weapon programs and further diplomatic activity of its own in Western Europe or the Soviets could become more willing to engage in substantive arms control negotiations. For example, they have long been aware of Western concerns about the continuing Soviet buildup of modern INF. It was not until the prospect of Western deployments became real, however, that the USSR displayed any sign of willingness to negotiate limitations on its own theater nuclear systems.

4. Allies' Perceptions and Reactions.

Allied confidence in NATO's deterrence posture derives not merely from the capabilities of US forces, but also from the clearly perceived cohesion of the Atlantic Alliance. This cohesion is dependent upon our Allies' perceptions that there is a linkage of theater forces -- conventional, shorter-range nuclear forces, and INF -- to US strategic forces. Thus, on the one hand, while there is an acknowledged requirement for improved INF to counter recent Soviet gains, there is also some resistance among the Allies to increasing NATO's Europe-based long-range nuclear capability in the fear that a Euro-strategic balance may be created which would decouple NATO nuclear forces from US strategic forces.

At the same time, [deleted].

NATO's decision to modernize its longer-range INF missiles is directed toward lessening perceptions of gaps in the continuum of NATO capabilities and to enhance deterrence, Alliance cohesion, and stability.

E. Technological Implications.

The major technological impact of current INF modernization programs is likely to be their effect on the weapons acquisition policies of other countries.

While the increased capabilities of advanced cruise missiles might make their production militarily and politically attractive to some nations, because of the high technology required and high development costs it seems unlikely that, except in a few cases, such programs are likely to be undertaken. [Deleted]. The current non-US systems could undoubtedly be upgraded, but the limited research, development, and production bases of many nations, coupled with the high cost of developing advanced cruise missiles, make them an unattractive acquisition option for all but a select few. Manned aircraft continue to present more readily available and sufficiently flexible delivery systems to meet the present needs of most states.

Similarly, most smaller countries would not seek a conventionally-armed cruise missile whose payload and high accuracy would be militarily significant only when combined with sufficient tactical air power. Large numbers of cruise missiles would be required for the same task as limited numbers of aircraft. Manned aircraft, which also possess some stand-off capability, could deliver greater payloads and more varied munitions.

[Deleted]

[deleted].

Other countries may intend cruise missiles for less demanding missions than the US. In such cases, development of relatively unsophisticated cruise missiles could be seen as being practical. Development of cruise missiles similar to ours, however, could present formidable technical obstacles to other states. In any case, the impact of the US decision to deploy cruise missiles on the incentives of our allies to assume a similar course is uncertain.

[Deleted].

[Deleted]

[deleted].

It should be noted that, although the US air-launched cruise missile provides a major incentive for the USSR to pursue option "a" above, the USSR already has considerable incentives in this regard, and is clearly moving in this direction.

[Deleted].

F. Potential Interaction with Other Programs.

As discussed previously, INF are important to deterrence because they constitute a link between conventional capabilities and US strategic forces. [Deleted]

[deleted]. The range of options resulting from conventional, theater nuclear, and strategic forces provides some possibility of controlling escalation and stopping conflict at the lowest level possible should deterrence fail. Additionally, the increased operational control, survivability, and flexibility of these nuclear forces strengthen stability.

Moreover, the increased survivability of PII, GLCM and SLCM might allow the West to put relatively less dependence on aircraft for the delivery of nuclear weapons, thereby releasing some aircraft for conventional roles. This increased conventional capability could aid in raising the nuclear threshold, and at the same time, improve survivability and stability.

Underlying this discussion is the overall requirement for longer-range INF modernization to improve NATO's deterrent posture and allay concern over inadequacies in NATO's long-range theater nuclear strike capabilities, while taking account of the requirement for the continued credibility of US-based and sea-based nuclear systems and possible Soviet responses to NATO action. New deployments of long-range theater nuclear systems will strike a balance, so as to reassure Allies and enhance deterrence by providing more effective INF, but not so as to undermine the credibility of the US strategic commitment to NATO, nor unnecessarily provoke Soviet responses detrimental to Western security.

G. *Verification*.

Any arms limitation treaty agreed upon by the US must provide verification measures on which the US can rely without hesitation.

[Deleted].

[Deleted]

[deleted].

[Deleted].

[Deleted]

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* The fuel exhaustion range of cruise missiles is the range definition used in the SALT II Agreement.

[deleted].

[Deleted].

[Deleted].

[Deleted]

[deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The PERSHING II, GLCM, and SLCM programs are consistent with US arms control policy and related Presidential decisions and are not constrained by existing arms control agreements.

The effect of US modernization programs on current and prospective arms control negotiations has already been demonstrated in the INF talks. In the face of Allied resolve to go forward with INF deployments, the Soviets dropped their preconditions for entering into negotiations with the US. US modernization programs could engender further modernization of Soviet TNF. On balance, however, there would be little prospect for concrete arms control results involving INF in the absence of NATO's decision to modernize these forces.

The effect of [deleted].

The impact of PII and cruise missiles on global and regional stability is a function of [deleted]

[deleted].

The technological implications of these programs [deleted].

PII and GLCM have synergistic effects with each other, battlefield tactical nuclear systems, and other nuclear weapons used in long-range theater roles. TNF interact with both conventional and US strategic forces in the doctrine of flexible response, providing for enhanced deterrence and the possibility of escalation control should deterrence fail. They also allow overall improvements to the survivability and stability of NATO's theater nuclear posture. The Alliance's decision on new longer-range INF missile systems strikes a balance so as to enhance deterrence by providing NATO with more effective TNF, while not undermining the credibility of the US strategic commitment to NATO, nor unnecessarily provoking Soviet responses detrimental to Western security.

NATO's decision to modernize its longer-range INF missiles provides for the deployment of PERSHING II and GLCM, but without increasing the current nuclear weapons stockpile in Europe. The modernization decision includes a parallel NATO decision on an arms control approach to the Soviet Union involving INF.

With respect to potential future arms control agreements, mobile systems such as the SS-20 and GLCM are likely to present difficulties for verification. In summary, the US PERSHING II, GLCM and SLCM programs are important to deterrence and stability. Like any nuclear modernization program, however, they entail political costs and carry with them important arms control implications. In this regard, we will continue to ensure that these programs are consistent with our overall national security objectives, including the development of future options for limiting strategic and theater nuclear arms to ensure deterrence and global stability.

SHORT-RANGE NUCLEAR FORCES

SHORT-RANGE NUCLEAR FORCES

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
Procurement	W70-3 Warhead (LANCE) (DOE)
Procurement	W79 Warhead (8-inch) (DOE)
Procurement	8-inch Nuclear Projectile (DOD)
Development & Procurement	W82 Warhead (155mm) (DOE)
64603A (D385) & Procurement	Improved 155mm Nuclear Projectile (DOD)
63320A (D302)	Corps Support Weapon System (DOD)

Short-range Nuclear Forces -- dual-capable artillery and short-range missiles -- comprise the low end of the spectrum of US nuclear weapons. These weapons are an important component of NATO's military forces and deterrent posture. They are intended for use on the battlefield in direct defense or deliberate escalation against front line Warsaw Pact forces should the Pact engage in a nuclear conflict, or should NATO forces be unable to maintain a conventional-only defense against a Pact attack. These weapons support NATO's doctrine of flexible response which suggests the possibility that a conflict in Europe could be escalated in a controlled way to seek its termination. At the same time, because dual-capable short-range nuclear systems are likely to be involved in war at an early stage, their deployment and modernization raise several concerns. These concerns, long in the background of debates concerning NATO's nuclear planning, have become more prominent as a result of the controversy surrounding the reduced blast/enhanced radiation (RB/ER) feature of certain new warheads being produced for US short-range nuclear systems.

These new warheads are designed to improve various performance characteristics [deleted], more secure and responsive command and control, command disable capability, and greater safety than existing warheads possess. The enhanced radiation design makes possible a reduction in the blast and thermal yields of these weapons compared to the yields of their predecessors thus reducing the potential for collateral damage* to civilians, friendly military forces and real property should these weapons be used. At the same time the weapons' lethal radius would be maintained or improved through an enhanced emission of radiation.

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* Collateral damage is broadly taken to mean any form of undesired damage including civilian casualties and damage to the civilian infrastructure produced by the effects of friendly nuclear weapons.

On April 7, 1978, former President Carter announced that he had decided to defer production of weapons with enhanced radiation effects. At the same time, President Carter directed that modernization of the LANCE and 8-inch artillery-fired atomic projectiles (AFAPs) should proceed, with the ultimate decision concerning incorporation of the enhanced radiation feature to be made later. On October 18, 1978, President Carter announced his decision to proceed with the production of the LANCE and 8-inch AFAP warheads using designs which would permit their subsequent conversion to enhanced radiation warheads. In addition, to maintain the option of installing enhanced radiation elements later, some of the [deleted] enhanced radiation components were to be produced [deleted]. This was not a decision to produce enhanced radiation weapons. That decision was made by President Reagan on August 6, 1981, when he announced that enhanced radiation weapons would be produced and stockpiled on US territory. There are no plans to deploy enhanced radiation weapons (ERW) outside of US territory.

II. PROGRAM DESCRIPTIONS

Technical characteristics of existing and proposed warheads of US short-range nuclear systems are summarized below.

A. LANCE W70 Mod 3 Warhead.

1. Program Characteristics.

The LANCE is a mobile, surface-to-surface, ballistic missile system which can provide tactical nuclear (or conventional) artillery support on the battlefield under all-weather conditions and other visibility limitations (given effective target acquisition).

[Deleted].

All LANCE system Mods incorporate improved safety features and more secure command and control links than earlier nuclear weapon systems. [Deleted]. All W70 series warheads include a command disabling feature, which would permit them to be disabled non-violently [deleted], to prevent unauthorized use. [Deleted]. These warheads also incorporate Category D, Permissive Action Links with multiple code coded switches to prevent unauthorized arming of the warhead. This device requires insertion of a six-digit code to activate warhead functions. Multiple codes can also be used and managed to allow only selected weapons to be unlocked; this provides for selectivity and control in the release of warheads.

The LANCE has replaced the HONEST JOHN and SERGEANT missile systems previously deployed with US forces in Europe; replacement of these systems in the forces of several NATO countries (UK, FRG, Belgium, Italy and the Netherlands)* is complete. [Deleted]. Additionally, two LANCE battalions (a total of 12 launchers) are based in the US. [Deleted].

Nuclear-armed LANCE missiles can be fired to a range of between [deleted]. LANCE range provides a capability to attack targets well beyond cannon artillery range. It also makes it possible for LANCE battalions to remain further behind the front line own troops (FLOT), contributing to greater survivability of the system. The system is designed to cover the corps front [deleted]

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* [Deleted].
**[Deleted].

[deleted].

2. Program Status.

[Deleted].

[Deleted].

B. Corps Support Weapon System (PE 63320A).

1. Program Characteristics.

The Corps Support Weapon System (CSWS) is an Army program in the Concept Definition Phase to explore development of a corps-level replacement for the LANCE Missile System and to provide improved range, accuracy, survivability and responsiveness. The Mission Element Need Statement (MENS) for the CSWS which was approved in April 1981, is as follows:

> There is a need to attack targets at ranges beyond the capability of cannons and rockets with conventional, nuclear, and chemical weapons in order to destroy, neutralize, disrupt, or delay enemy forces (mobile, stationary, fixed). By slowing down the enemy's ability to reinforce and support the central battle, friendly forces can overcome the expected unfavorable force ratio.

It is the nuclear role that makes the CSWS eligible for inclusion in this ACIS.

A Special Task Force (STF) was established in March 1981, at the US Army Field Artillery Center, Fort Sill, Oklahoma, to manage the CSWS program during the Concept Definition Phase.

2. Program Status.

The STF will evaluate viable alternatives (e.g., Multiple Launch Rocket System derivatives, LANCE missile variants, PATRIOT missile variants, ground-launched cruise missile, wheeled versus tracked loader-launchers, etc.) to insure the system selected best meets the needs described in the MENS. The FY 1983 planned program calls for continuation of the Concept Definition Phase in FY 1983 and FY 1984. Validation and start of the Demonstration Phase are scheduled in FY 1985.

C. 8-inch Artillery-Fired Atomic Projectile (AFAP) (W79 Warhead/M-753 Projectile).

1. Program Characteristics.

The 8-inch howitzers are dual-capable artillery, able to deliver either conventional or nuclear projectiles. The M-753 AFAP is intended to replace the current nuclear 8-inch projectiles deployed with US and NATO artillery units although no decision has been made as to deployment of the W79. The M-753 would incorporate the W79 warhead.

The W79 warhead [deleted]. The W79 is designed to provide improved safety and security in arming, storage, and handling similar to the W70. [Deleted]

[deleted].

The principal features of the new 8-inch AFAP which would contribute to its greater effectiveness are increased delivery range, more accurate fuzing, and reduced response time. The present 8-inch round initially entered the US inventory in 1956; [deleted]. The present round makes [deleted].

The relatively short [deleted] range of the existing projectiles makes the 8-inch firing unit potentially more vulnerable to suppressive fire and conventional attack. The new projectile would increase the range to [deleted], not only increasing targeting flexibility and counterbattery capability, but also survivability. The new 8-inch AFAP would allow positioning of batteries further from the FLOT while at the same time improving area coverage of enemy targets by at least 40 percent.

[Deleted]

[deleted].

2. Program Status.

[Deleted]. Initial operational capability (IOC) for the W79 [deleted].

Full-scale production of the W79 was initiated [deleted].

D. 155mm Artillery-Fired Atomic Projectile (AFAP) (W82 Warhead/XM-785 Projectile).

1. Program Characteristics.

The 155mm howitzers are dual-capable artillery, able to deliver either conventional or nuclear projectiles. The XM-785 AFAP is intended to replace the current 155mm nuclear projectile deployed with US and NATO artillery units. The XM-785 AFAP will incorporate the W82 warhead.

NATO members generally have about four times as many 155mm artillery tubes as 8-inch artillery tubes (for example, the Central Region currently has approximately [deleted] tubes of 155mm artillery and approximately [deleted] tubes of 8-inch artillery). Most 8-inch units are currently certified for nuclear rounds, as are about [deleted] percent of the 155mm howitzer units; this percentage is expected to rise somewhat with the fielding of the new 155mm AFAP and a new family of NATO 155mm howitzers. These larger numbers of 155mm nuclear capable artillery pieces would help assure the survival of a substantial short-range nuclear capability in the event of a Warsaw Pact conventional attack or nuclear strike. A broadly based 155mm nuclear capability prevents the Pact from focusing its attack on the less numerous 8-inch artillery. [Deleted].

In September 1977, DOD formally requested DOE to initiate development engineering (DOE Phase 3) of the W82. The Phase 3 request stated that the new warheads should be [deleted].

The [deleted] warhead yield is expected to be [deleted], there would be an increase in yield and effectiveness as compared to the current W48 warhead, which has a [deleted].

The designers of the W82/XM-785 have taken advantage of technology developed in the 8-inch AFAP program to [deleted] include radar fuzing, rocket-assisted propulsion, and ballistic similitude with conventional ammunition.

As in the LANCE and the new 8-inch AFAP, command and control of the new warhead would be improved by use of a Category D PAL system. [Deleted]. Modernization of safety features are also included in the new projectile.

2. Program Status.

Development engineering (DOE Phase 3) began during FY 1978. As a result of a DOD budget review, the priority of the 155mm AFAP development was lowered resulting in the IOC being delayed. [Deleted]. The production completion date [deleted].

[Deleted].

In FY 1982, funds were requested to procure production-line quality fuzes, projectile-aft body/rocket motors, containers and fuze setters to support Development Testing/Operational Testing II in [deleted].

III. STATED MILITARY REQUIREMENTS

AFAPs and LANCE missiles are each designed to fill specific operational roles. Together, they provide unique capabilities not duplicated by other nuclear forces and provide NATO with a greater range of military options. As such, they contribute to the worldwide deterrence of nuclear and conventional aggression, and specifically enhance NATO's ability to wage nuclear war should it occur.

LANCE provides a capability for shallow interdiction of first and second echelon forces located beyond the range of nuclear cannon artillery. It thus complements the shorter range AFAPs. Its longer range and larger yield are best suited for strikes against semi-fixed and fixed targets, large concentrations of enemy forces massing for follow-on attacks, and materiel-type targets.

If the Corps Support Weapon System (CSWS) replaces the present LANCE system, it would be expected to assume the nuclear missions currently assigned to LANCE. [Deleted]. However, this [deleted] range would still be insufficient to strike targets in the Soviet Union from countries where the LANCE is deployed.

Even though the initial statement of requirement for improved short-range nuclear systems was made in the 1960s, the most recent expression of this was in the response to former President Carter's request for review of the requirement for tactical nuclear weapons. The review which was completed in late FY 1977 stated that:

> For these ground force tactical nuclear systems (tactical missiles and nuclear artillery) to retain their credibility as a contribution to the theater nuclear deterrent, long-standing deficiencies which were tolerable under earlier strategies must now be rectified, i.e., these systems must be modernized to face the current and future operational requirements and constraints of NATO's strategy of flexible response.

The review indicated that improved short-range nuclear systems are required, since current systems (8-inch and 155mm AFAP) are limited in range to approximately [deleted] km and have either too little military effectiveness (155mm) or a lower ratio of military effectiveness to collateral damage than may be acceptable (8-inch). Modernization requirements for LANCE and AFAPs include safety, security, flexibility, and more precise military application. Moreover, because of the possibility that artillery weapons, at least, might have to be used on or near NATO territory, [deleted] safety of our own troops have to be taken into consideration.

As compared to the SERGEANT and HONEST JOHN missiles it replaced, LANCE has improved accuracy, [deleted], and has greater range than the HONEST JOHN. It also makes possible quicker reaction times than the older systems. [Deleted]

[deleted].

The W70-1,-2 warhead now deployed for LANCE, does not provide as great a degree of flexibility or effectiveness as the W70-3 LANCE warhead which is a production change from the W70-2 warhead. The W70-3 provides LANCE [deleted]. This modification provides greater flexibility to the LANCE system which is particularly important for ranges beyond that of the 8-inch W79/M-753 projectile.

Missiles are necessary, but are not the only weapons needed to fulfill the missions assigned to short-range nuclear systems. As compared to dual-capable artillery, the relatively small number of LANCE launchers (and the expense of increasing that number), its lower rate of fire, and the larger distance required for minimum troop safety, limit the potential use of LANCE against a variety of targets in the forward battle area. Moreover, as compared to cannon artillery, missile systems which are deployed in fewer numbers require greater dependence on concealment, deployment in-depth, frequent movement, and communications security for their survivability.

DOD requirements for increased range, greater accuracy, more responsive command/control, greater safety, and reduced collateral damage are all reflected in the design of the proposed new rounds.

[Deleted], it should be noted that the new short-range nuclear systems have not been developed in response to these specific developments, but rather in concern over across-the-board improvements in Pact military capabilities.

IV. FUNDING ("then year" $ in millions)*

	FY 81 & Prior	FY 82	FY 83	FY 84 (Est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
W70-3 Warhead (LANCE, DOE)	[									]
Development $										
Production $										
W79-1 Warhead (8-inch, DOE)										
Development $										
Production $										
8-inch Improved Nuclear Projectile (PE 64603A-Project D663)					Deleted					
Development $										
Production $										
W82 Warhead (155mm, DOE)										
Development $										
Production $										
Improved 155mm Nuclear Projectile (PE 64603A - Project D385)										
Development $										
Production $										
Corps Support Weapon System										
Development $										
Production $	[									

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* Sources: DOD;DOE.

** FY 85-87, not to completion.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The modernization programs for short-range nuclear systems described in Part II of this ACIS are consistent with US arms control policy. In the absence of satisfactory international agreements to reduce nuclear stockpiles, there is a need to retain and modernize US theater nuclear capabilities, especially those which support NATO's strategy of flexible response.

In discussing the relationship between arms control policy and the modernization of short-range nuclear weapons, the analysis which follows considers the overall effects of the projectile/warhead programs W70-3, W79, and W82; [deleted].

1. Overall effects.

In its strategy, NATO has confirmed the role of dual-capable short-range artillery which can fire nuclear projectiles; these weapons are specifically supportive of the NATO doctrine of flexible response. The effective implementation of NATO doctrine in a manner consistent with announced strategy contributes to stability in Europe -- an arms control objective. The modernization of these warheads is consistent with arms control goals. Improvements in range, accuracy, [deleted], control, and security features -- all of which characterize the new warheads -- represent evolutionary changes in existing weapons and are unlikely to affect significantly existing perceptions of these weapons or their relationship to US arms control efforts.

The fact that short-range nuclear systems must be deployed near the front lines to be effective has been a cause of some concern because, conceivably, this forward deployment could tempt the Warsaw Pact to attack these NATO systems with their own nuclear systems, thereby drawing NATO into a nuclear exchange with all the dangers of escalation that implies. However, a Soviet strike probably would be initiated upon indication that NATO intended to use nuclear weapons or if necessary to achieve Soviet objectives and would target known nuclear storage sites and deployments, not just LANCE or dual-capable artillery. The improved command, control, and security features of both the modernized AFAPs and the current and modernized LANCE also should reduce the possibility of an unauthorized nuclear use. In both these ways, the short-range nuclear weapon programs are supportive of US arms control objectives.

2. Effect of [deleted] 155mm AFAP.

In the case of the 155mm AFAP, the fact that the new AFAP [deleted] does not detract from this assessment of consistency with US arms control policy. The higher yield creates a potential for increased collateral damage; however, achieving ballistic similitude with the new AFAP and thus improving delivery accuracy could ameliorate the problem so it does not necessarily follow that increased collateral damage would result. More importantly, the increased effectiveness of the 155mm AFAP should strengthen deterrence.

3. Effects of incorporating enhanced radiation.

The prospect of enhanced radiation weapons has already been incorrectly perceived by many, here and abroad, as representing a change in US doctrine which would make use of nuclear weapons more likely in a tactical situation and as introducing a fundamentally new nuclear weapon. Responsible US officials have stated repeatedly that enhanced radiation weapons would remain under the same strict political control as any other nuclear weapon. It is the US position that enhanced radiation weapons do not lower the nuclear threshold and that they represent evolutionary rather than revolutionary modernization of short-range nuclear systems. In any case, weapon modernization is not precluded by any treaty.

Additionally, the existence of more effective nuclear weapons with lower collateral damage potential and fewer expected civilian casualties may be perceived by adversaries to increase the likelihood that these weapons would be used in combat. Thus, the Soviets could believe that NATO's nuclear threats are more credible and that NATO has placed greater reliance on nuclear weapons for warfighting. In this event, availability of enhanced radiation warheads would increase deterrence of war overall, but at the same time could increase Soviet propensities to initiate the use of nuclear weapons if they have decided to go to war. This is, of course, the dilemma of nuclear deterrence, which must contain some threat of use to be credible. It is, however, NATO policy not to place greater reliance on nuclear weapons for either deterrence or warfighting.

B. Relation to Arms Control Agreements.

Article VI of the Non-Proliferation Treaty (NPT), to which the US, USSR, and 114 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). The US and the Soviet Union began arms control negotiations involving intermediate-range nuclear forces in Geneva, Switzerland, on November 30, 1981.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

The US is not party to any treaty or other legal obligation that would inhibit the development, production or deployment of short-range nuclear weapons.* Development of these weapons is not affected by the provisions of the yet to be ratified Threshold Test Ban Treaty.

The features intended to improve the security of, and help guard against accidental or unauthorized use of the W70-3, W79, and W82 warheads are supportive of the obligations incurred in the 1971 "Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics."

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* The provisions of Articles I and II of the Non-Proliferation Treaty, while not addressing deployment specifically, require that these nuclear weapons remain under US control.

There is no customary rule of international law or international convention which would prohibit the use of nuclear explosive weapons.* It is the US understanding, placed on record at the time of signing, that the rules established by the recently concluded Additional Protocol I to the 1949 Geneva Conventions** were not intended to have any effect on, and do not regulate or prohibit the use of nuclear weapons. We intend to repeat this understanding at the time of ratification, and we anticipate that most of our allies will make statements to the same effect.

C. Effect on Current and Prospective Negotiations.

[Deleted].

The US has been engaged in Comprehensive Test Ban Treaty (CTBT) negotiations with the UK and the USSR. These negotiations were recessed in November 1980 without setting a resumption date. [Deleted]

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* Article IV of the Outer Space Treaty and Article I of the Seabed Arms Control Treaty do, however, prohibit the stationing of nuclear weapons or other weapons of mass destruction in outer space or on the seabed or ocean floor.

** Adopted on June 8, 1977, by the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts, also known as the Law of War Conference.

[deleted].

Neither side has tabled proposals at the Mutual and Balanced Force Reduction talks in Vienna that would constrain the modernization of short-range nuclear weapons.

The short-range, nuclear-capable systems discussed in this ACIS [deleted].

At the May 1981 North Atlantic Council meeting of foreign ministers in Rome, the allies reaffirmed their December 1979 resolution to pursue TNF arms control negotiations while moving ahead with NATO TNF modernization. The NATO allies welcomed the stated intention of the United States to begin such negotiations with the Soviet Union by the end of CY 1981.

The Soviet Union has sought to gain propaganda advantages by proposing that the United States and the USSR mutually renounce the development and production of enhanced radiation weapons. Such an agreement [deleted]. More importantly, such an agreement would provide asymmetrical advantages to the Soviet Union. Although they also have offensive application, the principal value of enhanced radiation weapons lies in their potential use to defend against an armored offensive, a problem facing NATO but not the Warsaw Pact. In discussions with a group of US Senators, Brezhnev stated that the Soviets tested but never started production of a neutron bomb. [Deleted]. For reasons such as these, the United States has viewed the Soviet mutual renunciation proposal as propaganda.

D. Effect on Global and Regional Stability.

The US believes that nuclear forces play an important role in the defense of NATO. NATO's strategy of flexible response provides a variety of theater nuclear options in support of diplomatic and military efforts to bring the conflict to early termination on terms acceptable to the US and her allies.

[Deleted] were to materialize over the long-run, they could result in a marginal reduction in the nuclear threshold; that is, NATO may appear to be relying more on nuclear weapons than before.

On the other hand, failure to modernize NATO's short-range nuclear weapons could suggest to European countries that the US lacked the determination to use nuclear weapons, if necessary, to defend Western Europe. This also could weaken European incentives to strengthen conventional forces, or alternatively, cause them to strike out on their own if they came to believe that the ultimate deterrent was not credible. If taken along with improvements in US conventional capabilities, TNF modernization may be seen as demonstrating the US commitment and thus provide additional encouragement to the allies to strengthen their conventional capabilities. Such a response could raise the nuclear threshold. Even so, whether or not improvements in short-range nuclear weapons would have any discernible effect on the nuclear threshold is far from clear. The use of any nuclear weapon -- even low-yield, short-range weapons -- would constitute one of the most agonizing decisions that a political leader could face because of the risks implicit in the enemy's response and the grave dangers of escalation. The capabilities of conventional forces are likely to be far more significant determinants of the nuclear threshold than the relative effectiveness of short-range nuclear weapons. For this reason, NATO consistently has set conventional improvements as its highest priority.

E. Technological Implications.

Despite the fact that the new short-range nuclear weapons are more capable than weapons already deployed in Europe, their production is not likely to significantly affect East-West competition in military technologies. NATO has had small-yield artillery weapons in its stockpiles since the late 1950s; the Soviet Union possesses rockets (FROG series) with nuclear warheads and [deleted]

[deleted].

The effect on technological competition with the USSR of the decision to produce RB/ER weapons is not yet known. Soviet leaders have stated that they would produce these weapons if the US did: [deleted].

President Valery Giscard d' Estaing, at his press conference on June 26, 1980, announced that France had developed and tested a prototype of a neutron warhead and would be ready in two or three years to decide whether to produce it. On September 14, 1981, Prime Minister Pierre Mauroy declared that the new Mitterand Government would continue research and development on neutron weapons in order to preserve the nuclear independence of France.

[Deleted]. An unclassified Chinese publication indicates that [deleted].

F. Potential Interaction with Other Programs.

Theater nuclear forces are important to deterrence as a link between conventional capabilities and US strategic forces. The short-range nuclear weapons represent one end of this spectrum of nuclear deterrence -- through the threat they pose to Warsaw Pact front-line troops.

Modernized short-range weapons would add to the military effectiveness of theater nuclear forces. This overall effectiveness of TNF would be enhanced by incorporation of enhanced radiation features in certain short-range nuclear weapons. These RB/ER weapons are designed to increase the vulnerability of massed Warsaw Pact tank forces in the Western and Eastern European area.

The relationship among programs is reinforced by the increasing interdependence of arms control negotiations on strategic, intermediate-range nuclear forces (INF), and conventional weapon systems. In this regard, negotiations with the Soviets on intermediate-range nuclear forces have begun.

In accordance with standard DOE practice, the nuclear material which will be recovered upon retirement of the currently deployed 8-inch AFAP is planned to be reused in the production of new and replacement warheads for the nuclear weapons stockpile.

G. Verification.

At the present time, no arms control agreements apply to short-range nuclear warheads. [Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Modernization of NATO short-range nuclear weapons is consistent with US arms control policy. Improvements planned for these weapons will increase NATO's capability to deter a conventional or nuclear attack by the Warsaw Pact. Moreover, if deterrence fails, these weapons could enhance NATO's capability to use nuclear weapons effectively and with restraint.

These modernized weapons provide significant improvements in the range, accuracy and reliability of warhead yield in the case of AFAPs, and for both LANCE and AFAPs provide improvements in command and control, as well as safety and security improvements over older nuclear weapons. They, therefore, contribute to stability through greater operational control, survivability, reliability, and flexibility in use.

FLEET AIR DEFENSE SYSTEMS

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
64303N	Area Air Defense
64352N	New Threat Upgrade
64353N	Vertical Launching System
64365N	[Deleted]
64366N	STANDARD Missile Improvements
DOE Program	W81 [Deleted]
Procurement	RIM-66B STANDARD MR
Procurement	RIM-66C STANDARD MR
Procurement	RIM-67B1/67C1 STANDARD ER
Procurement	Surface Missile System Ordnance Alteration, Air Defense, TERRIER
Procurement	SMS Ordnance Alteration, Air Defense, TARTAR

STANDARD missiles are ship-launched, surface-to-air missiles (SAMs) intended for surface combatant defense against air-breathing threats. Improvements, such as stand-off jammer suppression, vertical launching systems, and nuclear warheads, are intended to counter new, more capable air-breathing threats to warships.

II. PROGRAM DESCRIPTIONS

A. Capabilities.

Several versions of the STANDARD Missile (SM), the primary family of fleet air defense SAMs, are currently operational in about 60 ships and programmed for over [deleted] ships through the 1980s. SM-1 MR (RIM-66B), the medium range (MR) version of the first operational SM, is deployed in guided missile cruisers (CGs), destroyers (DDGs), and frigates (FFGs) equipped with TARTAR fire control systems and provides intercept capabilities at altitudes up to [deleted] and slant ranges out to [deleted]. SM-1 ER (RIM-67B1), the extended range (ER) version, is deployed in cruisers and destroyers equipped with TERRIER fire control systems and provides intercept capabilities at altitudes up to [deleted] and slant ranges out to [deleted]. Both medium and extended range versions of the SM-1 are equipped with semi-active guidance. The SM-1 also has a limited, secondary surface-to-surface capability.

An improved version of the STANDARD Missile, the SM-2, has been developed for use with the AEGIS weapons control system (WCS) on CG-47 TICONDEROGA class cruisers, TERRIER guided missile fire control system (GMFCS) cruisers, and TARTAR GMFCS cruisers and destroyers. Like its predecessor, two versions of the SM-2 exist -- SM-2 MR (RIM-66C) has a range of [deleted] and SM-2 ER (RIM-67C1) a range of [deleted]. Other improvements are a mid-course guidance capability, an inertial reference system, and greater resistance to electronic countermeasures (ECM). They also retain a limited surface-to-surface capability.

Early SM-1 MR serial improvements were made to guidance, fuze, and autopilot subsystems while retaining the stock guidance and propulsion system. Later production improvements were made to improve ECM, weaving target intercept, motor thrust, target detection device, and warhead capabilities.

The SM-1 and SM-2 use common steering control units, propulsion, fuze, warhead, and airframe surfaces. SM-2 MR development efforts have led to an [deleted] , inertial reference unit, and mid-course guidance unit.

The most difficult target currently facing US naval SAMs are the Soviet [deleted]. These cruise missiles characteristically attack from [deleted]. Efforts to successfully counter this threat are being carried out under the New Threat Upgrade (NTU) Program and are directed at developing: (1) modifications to the basic TERRIER and TARTAR CG/SM-2 combat system design; (2) a high speed version of the SM-2; (3) a more lethal fuze/warhead combination for STANDARD Missiles;

and (4) a new rocket motor for the medium range version of the SM-2.

Concurrent with efforts to improve missile performance, other programs are aimed at improving supporting systems. Soviet stand-off jamming of naval defensive radars poses a serious threat which must be eliminated or reduced to levels consistent with effective fleet defense [deleted]. The fleet must also be able to defend itself against coordinated high density attack initiated from many quadrants. Therefore, radar performance, threat information processing, defense fire control reaction time, and defensive missile refire times must be improved. One project of a continuing nature addresses changes in TERRIER and TARTAR systems on guided missile cruisers and destroyers and frigate fire control systems necessary to enhance the effectiveness of improved STANDARD missiles. Reductions in [deleted] are being emphasized. A separate project is concerned with a New Threat [deleted] Upgrade development program for nuclear powered guided missile cruisers (CGNs) with SM-2 and for DDG-993 KIDD class guided missile destroyers. In general, this upgrade emphasizes ability to detect, track, and engage [deleted] threats in severe ECM environments and support SM-2 missiles in the engagement of these threats [deleted].

A companion to the air defense program will develop a system that enables surface combatants to engage airborne, surface, and subsurface targets flexibly from modules of vertical launch tubes, thus eliminating launcher reload requirements while retaining a variety of anti-submarine, anti-aircraft, and cruise missiles in almost immediate launch readiness. This vertical launching system, under development, can be used in conjunction with the AEGIS WCS and the SM-2 MR. The AEGIS WCS is an integrated air defense system built around a multi-function phased-array radar. It is designed to search for and detect targets, provide fire control solutions, and transmit mid-course guidance commands for simultaneous engagement of up to [deleted] targets.

The AEGIS/SM-2 MR system is to be deployed on CG-47 TICONDEROGA class cruisers. IOC will be in [deleted] and [deleted] ships are to be delivered by the end of [deleted]. Total build of this class is presently set at 24. The first five ships will have the dual-arm MK-26 missile launcher and the remainder will have a vertical launch system. TARTAR/SM-2 MR capability will also be deployed during this period on [deleted] CGN-38 VIRGINIA class cruisers, the [deleted] CALIFORNIA class (CGN-36) cruisers, and the [deleted] KIDD class (DD-993) destroyers. Before CG-47 anti-air warfare (AAW) cruisers can be deployed in increasing numbers, [deleted] ships of the DDG-2 ADAMS class will be modernized with improved TARTAR/SM-1 MR capability. TARTAR/SM-1 MR will also be deployed on FFG-7 PERRY class frigates during this period. Total procurement planned for this class is 59 ships. TERRIER/-SM-2 ER systems will be deployed on [deleted] of the CG-16 LEAHY and CG-26 BELKNAP class ships plus the [deleted].

In addition to the various versions of conventionally-armed missiles discussed thus far, there is a [deleted]. Production of the W81 was deferred in 1980 pending completion of a study of military need and arms control impact. Funds for nuclear SM-2 [deleted] development were included in the FY 1981 and 1982 revised budgets. [Deleted] warheads are planned in both the DOE and DOD budgets; the specifics occur (as with all nuclear production) when the [deleted].

B. Program Status.

Funding is being requested in FY 1983 for procurement of 650 SM-1s MR; 150 SM-2s MR; and 450 SM-1s ER/SM-2s ER. Under PE 64366N during FY 1983: developmental and operational flight testing of SM-2 MR will be completed; fabrication will continue on MR flight test vehicles; 24 SM-2s MR will be delivered for CG-47 testing; three SM-2s MR will be delivered for CGN/TARTAR testing; ten SM-2s MR will be delivered for vertical launch AEGIS testing; ten ER flight test round firings are planned at-sea; ten MR flight test rounds for vertical launch AEGIS WCS firings are planned at-sea; and SM-1 rocket motor development and qualifications will be completed and released for production. Combat system improvements would be continued.

During FY 1983, W81 warhead section design of the [deleted] will continue under PE 64365N.

Under PE 64353N, a vertical launch system module will be installed in a DD-963 SPRUANCE class destroyer and interface compatability test firings with SM-2 will take place.

FY 1983 PE 64372N activity includes complete TARTAR electronic counter countermeasures (ECCM) integration testing of modifications and procurement of limited production systems for TERRIER ships and TERRIER ship system trainers. System integration and certification for SM-2 will also be performed as well as beginning development of modifications to provide compatability with NTU sensor systems and SM-2. Reliability and maintainability modifications will continue and engineering development of the coherent transmitter and integration with the engineering development model for at-sea testing will be completed. Integration and certification of a CGN/SM-2 GMFCS modification will be completed and modifications of this system to provide compatability with upgraded sensor systems and the SM-2 will begin.

Under PE 64373N during FY 1983, engineering development will commence to improve the weapon direction system and a long term major upgrade of the GMFCS for FFG-7 OLIVER HAZARD PERRY class frigates will be assessed; modifications to AEGIS WCS would continue; at-sea testing of the AEGIS WCS engineering development model with SM-2, the vertical launch system, and battle group anti-air warfare coordination would be supported; and subsystem testing, qualification, and limited production decisions will continue.

III. STATED MILITARY REQUIREMENTS

Among the more formidable threats to naval battle groups are conventional and nuclear warhead anti-ship cruise missiles. Added to the threat posed by the technical capability of these missiles is the [deleted] ability to perform coordinated attacks nearly simultaneously from widely separated directions and from a variety of launch platforms, i.e., aircraft, surface combatants, and submarines. Cruise missile defense is also complicated by the fact that some [deleted], use a high altitude steep diving angle attack. Battle groups of the future must be able to defend against coordinated, multiquadrant, bilevel attacks.

The primary air-launched Soviet cruise missile threats are the AS-4 KITCHEN, launched from either the Tu-22 BLINDER or the Tu-22M BACKFIRE bombers, and the AS-6 KINGFISH, carried and launched from the Tu-16 BADGER bomber. Both cruise missiles can be launched from stand-off ranges in excess of [deleted], fly inbound at [deleted].

Ship-launched Soviet cruise missiles of concern to naval planners include the [deleted], SS-N-12 SANDBOX, SS-N-9 SIREN, and SS-N-7. The [deleted]. After launch, possibly up to [deleted] from targets, they climb to [deleted]. These cruise missiles are believed to be equipped with [deleted] are the SS-N-7, [deleted]. The SS-N-7 has a range of about [deleted], a cruise altitude of [deleted], and a speed of Mach [deleted].

The SS-N-9 has a range of about [deleted] and cruises at [deleted] at about [deleted].

All of these Soviet cruise missiles are believed able to carry either conventional high explosive or nuclear warheads. The specific yields for the optional nuclear warheads [deleted] are likely since this range of yields suits the anti-ship mission and postulated payloads of these missiles.

Programmed and developing improvements to fleet air defense weapons control systems and associated SAMs would give the US Navy significantly greater capabilities to deal with projected cruise missile threats, particularly in scenarios involving massed coordinated raids against US battle groups operating without support of naval aviation or within range of Soviet Naval Aviation bases. STANDARD missiles launched from guided missile cruisers, destroyers, and frigates and controlled by upgraded TARTAR GMFCSs, TERRIER GMFCSs, and AEGIS WCSs would provide intercept capabilities to [deleted] and at altitudes up to [deleted].

If upgraded weapons control and GMFC systems, longer-range SAMs, vertical missile launchers, and a nuclear warhead for SAMs were not developed and deployed, the Navy would be much less capable of defending against [deleted]. This would be true particularly of those surface elements operating independently of aircraft carriers. Not countering the new Soviet cruise missile threats to the fleet could result in reduced flexibility for US naval operations thus constraining the options available to policy-makers in future crises.

The kill mechanism of the two types of conventional STANDARD missile warheads are either the [deleted]. Against air targets, the aerodynamic damage probability of both warheads depends upon a number of factors including target hardness, engagement geometry, and fuzing, but tends to fall off rapidly when miss distances exceed [deleted]. The conventional missile has a [deleted]. The prime advantage of a nuclear warhead is its ability to destroy attacking [deleted] to greatly extended lethal radii. In spite of the considerable conventional capability of planned and improved SM-2 systems, these missiles may be [deleted]. Therefore, the Navy is re-emphasizing development of the [deleted]. The rationale for an [deleted] is that, while the conventionally-armed SM-2 could successfully intercept and [deleted]

[deleted].

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Area Air Defense (PE 64303N)										
Development $	37.9	34.2	8.2	8.4	Cont.					
Production $	(Not Applicable)									
New Threat Upgrade (PE 64352N)										
Development $	62.6	42.5	45.3	45.0	Cont.					
Production $	(Not Applicable)									
Vertical Launching System (PE 64353N)										
Development $	120.7	70.4	33.9	26.8	Cont.					
Production $	(Not applicable)									
[Deleted] (PE 64365N)										
Development $	12.9	13.2	18.8	18.8	TBD					
Production $	(Not applicable)									

IV. FUNDING ("then year" $ in millions) (Cont.)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
STANDARD Missile Improvements (PE 64366N)										
Development $	140.5	50.6	50.8	62.4	Cont.					
Production $	(Not Applicable)									
W81 [Deleted] (DOE Program)										
Development $	[Deleted]									
Production $	[Deleted]									
RIM-66B STANDARD MR (Procurement)										
Development $	92.0	15.7	10.4	10.0	10.4	139.1				2090.6
Production $	740.7	170.2	260.8	264.2	743.8		2179.7	9260	0.235	
RIM-66C STANDARD MR (Procurement)										
Development $	116.7	24.6	18.6	17.3	35.7	207.9				971.1
Production $	64.4	62.7	125.0	208.1	1928.2		2388.3	4170	0.573	

IV. FUNDING ("then year" $ in millions) (Cont.)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
RIM-67B1/RIM-67C1 STANDARD ER (Procurement)										
Development $	209.9	11.5	9.4	16.7	33.7	280.3				2622.9
Production $	660.9	223.4	310.0	359.0	1356.7		2910.1	6931	0.420	
SMS TERRIER (Procurement)										
Development $										
Production $	84.7	37.8	NA	NA	NA					
SMS TARTAR (Procurement)										
Development $										
Production $	38.1	53.6	NA	NA	NA					

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Upgrading conventional fleet air defense capabilities is consistent with US arms control policy. Improvements in missile range, guidance, and ability to deal with multiple targets would reduce the prospective vulnerability of fleet battle groups operating in the projected combined Soviet air, sea, and subsurface severe threat environment. As such, these programs would improve the US Navy's projected capability to perform a variety of vital missions in peacetime and in war and thereby contribute to the deterrence of war and to international stability. These objectives, of course, are shared by US arms control policy.

The SM-2 MR can be carried by certain ships equipped with the modified TARTAR launching system. [Deleted] AAW capability for the first time. These modifications, in addition to the planned procurement of AEGIS WCS-equipped ships carrying [deleted], would revise the decline underway since 1968 in the number of platforms equipped with nuclear-capable air defense systems (see TABLE 1).

TABLE 1: Numbers of Ships with Nuclear AAW Capability

Nuclear System	1970	1980	1988 (est)
TARTAR/SM-2 MR	0	0	[Deleted]
TERRIER/BTN	37	32	[Deleted]
TERRIER/SM-2 ER	0	0	[Deleted]
TALOS	7	0	[Deleted]
AEGIS/SM-2 MR	0	0	[Deleted]
Totals	44	32	[Deleted]

B. Relation to Arms Control Agreements.

The United States is not a party to any arms control agreement which restricts deployment of naval AAW weapons or their supporting systems.

Deployments of CG-47 TICONDEROGA class ships equipped with the [deleted] should not set precedents for interpretation of Article VI of the Anti-Ballistic Missile (ABM) Treaty. Article VI of the Treaty provides that neither side is to give "capabilities" to counter strategic ballistic missiles to other than ABM[***] missiles, launchers, or radars, but does not define the meaning of "capabilities" in specific terms. Article VI also provides that non-ABM missiles, launchers, and

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[Deleted].

** LONG BEACH (CGN-9) carried both TERRIER and TALOS. TALOS was removed but the ship will retain a [deleted].

*** ABM is synomymous with ballistic missile defense (BMD).

radars will not be tested in an "ABM mode". There is agreement that the [deleted] would have essentially no capability against strategic ballistic missiles. The system also would not be tested in an "ABM mode".

In assessing the ABM potential of Soviet air defense systems, the US uses observable characteristics such as [deleted] as major technical indicators of such capabilities. In its planned configuration, the AEGIS WCS would have observables of about [deleted].

The provision in Article VI which prohibits giving non-ABM missiles, launchers, or radar an ABM capability was included in the ABM Treaty at US insistence to prevent the Soviets from circumventing the limits on ABMs by giving their widely deployed SAM systems an ABM capability. In the ABM Treaty negotiating record the US set forth a list of indicators for judging whether a SAM system had an ABM capability. These indicators included phased-array radar and nuclear-armed interceptors. The US and USSR have previously deployed nuclear armed air defense systems. However, [deleted] would represent the first US mating of a non-ABM nuclear interceptor with a phased-array radar system.

The Soviets have deployed SAMs with phased-array radars. [Deleted]. For example, the Soviet [deleted]. Further similarities exist between the [deleted]. On the basis of the comparability of the [deleted].

It is in the US interest for both parties to the ABM Treaty to avoid steps which would make verification of the Treaty more difficult.

It would be very desirable, although difficult, to differentiate among those modern defense systems intended for defense against air-breathing, tactical ballistic missiles, or strategic ballistic missile threats. To constrain US programs without firm categorization criteria could result in the US being more self-constrained than the Soviet Union in developing high performance air defense systems.

In summary, [deleted] would not be precluded by the ABM Treaty, and is consistent with US arms control obligations. The arms control concern expressed by some in the mid-to-late 1970s that its deployment might lead to [deleted] is no longer justifiable in light of [deleted].

C. Effect on Current and Prospective Negotiations.

The AEGIS WCS with conventionally armed interceptor missiles is not likely to have an impact on any current or prospective arms control negotiations.

Planned development of the W81 warhead is scheduled for completion by [deleted].

The US has been engaged in Comprehensive Test Ban Treaty (TBT) negotiations with the UK and USSR. These negotiations were recessed in November 1980 without setting a resumption date. [Deleted].

D. Effect on Global and Regional Stability.

The conventional AEGIS/SM-2 system is designed to improve the Navy's air defense capability, thereby improving the conventional combat capability of the fleet and its ability to deter war, and thus enhancing global and regional stability.

Judgments as to the probable impact of deploying [deleted] hinge on assessments of the potential effects of the system on deterring attacks on US naval forces, on the defeat of nuclear attacks on US naval forces, and on Soviet assessments of the likelihood that the US would employ nuclear-armed missiles to defend naval forces.

The US believes it is important to retain a nuclear air defense capability on US surface combatants to be able to threaten a nuclear defense and to also increase the chances of surviving a Soviet nuclear attack on US naval forces [deleted]. Uncertainty in the minds of Soviet planners as to how the US might respond to hostile actions and how successful such attacks might be -- because of the presence of [deleted] aboard US warships -- will serve to strengthen deterrence of such attacks in time of crisis.

The possibility of other US responses to an attack on a high-value target such as a carrier battle group would pose additional uncertainties for Soviet planners. A US response might not be limited to direct defense. It is the certainty of some response, but uncertainty about its form, that underpins nuclear deterrence on the one hand, and flexible response, on the other.

If a theater-level war -- conventional or nuclear -- broke out, the [deleted]. The initial attack might not be nuclear, depending upon [deleted].

[Deleted]. This possibility then could increase Soviet incentives to exercise forbearance in the use of nuclear weapons against US naval forces.

US naval forces that were only equipped with conventional defenses would present more vulnerable targets for air-launched Soviet attacks. [Deleted]. Whether the use of nuclear weapons over an ocean area would lead directly to escalating the associated land campaign is unknown.

Thus, while it can be argued that Soviet perceptions of US naval strengths or vulnerabilities could lead to Soviet use of nuclear weapons, it is US belief that US naval nuclear SAMs could reduce the likelihood of Soviet use of nuclear weapons.

E. Technological Implications.

The AEGIS WCS uses a phased-array radar. Its ability to track and engage large numbers of targets simultaneously exceeds that of existing air defense radars.

The present SM-2 represents a [deleted]. Following the initial boost, the [deleted]. At the extremes of [deleted]. The improved SM-2, however, would correct these deficiences.

The Soviets could attempt to offset the AEGIS/SM-2 system by deploying higher performance missiles and offensive aircraft in conjunction with improved ECM.

In the 1950s and 1960s many air defense systems were armed with nuclear warheads to compensate for expected miss distances outside the lethal range of conventional warheads. Recently, more sophisticated air defenses (IMPROVED HAWK, PATRIOT, and modern air-to-air missiles) have been developed which are able to destroy their targets with modern conventional warheads. The obvious advantage is that, being less constrained by political considerations and costs, they offer greater utility in a wide spectrum of circumstances. Thus, non-nuclear kill is preferable. [Deleted]

[deleted].

F. Potential Interaction with Other Programs.

The interactive implications of AEGIS WCS deployment with the [deleted] were discussed in Section V B. above.

G. Verification.

[Deleted].

[Deleted] the multi-purpose vertical launch system which would be able to fire nuclear and conventionally-armed SM-2s, TOMAHAWK long-range cruise missiles, ASW standoff weapons (SOWs), and conventionally-armed short-range HARPOON cruise missiles. [Deleted], any ship employing the externally identical vertical launch system could be challenged just as all STANDARD Missile-capable ships will be suspected of carrying [deleted] is deployed.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The AEGIS/SM-2 system with only conventionally-armed interceptors had no adverse arms control implications. [Deleted]. However, both systems, by increasing the air defense capabilities of the fleet, would improve the stability of the force balance between the US and USSR and give the Navy increased flexibility of operation in future crises. These two effects should serve to strengthen the deterrence of war and enhance international stability.

In conjunction with the [deleted] could provide fleet commanders with the ability [deleted] system in itself would be consistent with US arms control obligations and deployment of the system should not [deleted] the concept of identical launch tubes for several types of missiles may complicate verification. These and other arms control aspects must be weighed within the overall need to assure that our limited naval assets remain a viable force.

MEDIUM-RANGE AIR-TO-SURFACE MISSILE

I. INTRODUCTION

This Arms Control Impact Statement (ACIS) addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
63369N	Tactical Air-Launched Cruise Missile
64614F	Medium-Range Air-to-Surface Missile
27164F & Procurement	Medium-Range Air-to-Surface Missle

The medium-range air-to-surface missile (MRASM) is a conventionally armed, tactical cruise missile for both anti-ship and land-attack employment. The Joint Cruise Missile Project Office (JCMPO) managing the MRASM program is developing joint services conventional air-to-surface standoff missiles capable of all-weather attack against heavily defended high-value fixed targets. The MRASM is an adaptation of the AGM/BGM-109 TOMAHAWK cruise missile. The MRASM program includes both Navy and Air Force variants -- the Navy's AGM-109L and the Air Force's AGM-109H.

II. PROGRAM DESCRIPTIONS

A. Capabilities.

Two variations of the MRASM have been identified for conformance with the different target priorities and operating constraints required by the Navy and the Air Force. These variations -- both land-attack -- will employ a turbojet propulsion system with a straight-line fuel exhaustion range of under 600 kilometers and use terrain contour matching (TERCOM) for enroute navigational updates. Pertinent characteristics of the MRASM and other TOMAHAWK adaptations are summarized in Table 1.

TABLE 1 TOMAHAWK CHARACTERISTICS

Cruise Missile	Payload	Fuel Exhaustion Range (km)	Type	Length (inches)	Length Difference from GLCM (inches)	Wing Type	Engine
GLCM (BGM-109G land-attack)	nuc.	[deleted]	TOMAHAWK	219		straight	turbofan
TLAM-N (BGM-109A land-attack)	nuc.	[deleted]	TOMAHAWK	219	none	straight	turbofan
TLAM-C (BGM-109C ship-launch)	conv.	[deleted]	TOMAHAWK	219	none	straight	turbofan
TLAM-C (BGM-109C sub-launch)	conv.	[deleted]	TOMAHAWK	219	none	straight	turbofan
MRASM (Air Force AGM-109H air-field-attack)	conv.	[deleted]	TOMAHAWK	232	13	straight	turbojet
MRASM/TALCM (Navy AGM-109L land-attack)	conv.	[deleted]	TOMAHAWK	192	27	swept	turbojet

As indicated, the Navy MRASM is 192 inches long. It weighs about [deleted] and has 15 degree swept wings to adjust the aerodynamic characteristics of the missile created by the shortened fuselage. It will use TERCOM for enroute navigational updates [deleted].

The Navy MRASM has been designed for an operational range of about [deleted]. The installed [deleted] originally produced for the [deleted] missile, is designed to penetrate concrete structures.

The Navy intends to use the A-6 as the primary MRASM launch platform. The A-6 could carry four MRASMs on wing-mounted external stores stations; [deleted].

The Air Force airfield-attack AGM-109H MRASM has an operational range of about [deleted]. This weapon employs a [deleted] warhead. The submunitions being developed by Lawrence Livermore National Laboratory would [deleted] which is designed to inhibit operational use of runways and taxiways. The Air Force [deleted]. MRASM's standoff capability would reduce risk to manned aircraft and allow attack of runways; operating bases; aircraft shelters; maintenance, supply, and storage facilities.

The length of the Air Force MRASM is 232 inches to accommodate the proposed ordnance. It is expected to weigh approximately 2900 pounds and will have the standard TOMAHAWK straight-wing design. Guidance would be by TERCOM for the mid-course phase of the flight path [deleted].

The aircraft proposed to carry the Air Force MRASM are the B-52 and possibly the F-16 as a secondary carrier. Anticipated carriage on the B-52 is either twelve or twenty missiles. The most likely F-16 combat load is two missiles. Four MRASMs could conceivably be carried, but combat maneuverability would be unacceptably restricted.

C. Program Status.

1. AGM-109H. The baseline MRASM program was intended to achieve a FY 1985 initial operational capability (IOC) for the AGM-109H; due to funding restraints, an [deleted]. Included in the baseline program is integration of the missile on the B-52 and an investigation of the F-16 as a MRASM launch platform.

The FY 1983 program consists of integration of the guidance system, warhead, and airframe to accomplish initial development testing.

The FY 1984 program is scheduled to include the conduct of Development Test and Evaluation and Initial Operational Test and Evaluation of the AGM-109H to include free-flight tests delivering complete patterns of live submunitions against runway type targets.

2. AGM-109L. The programmed IOC for the AGM-109L [deleted]. The Navy zeroed the program in March 1981. In July 1981 the Congress authorized monies to reactivate development. The Navy plans to enter Full Scale Engineering Development in the [deleted] looking to an initial missile delivery in [deleted].

III. STATED MILITARY REQUIREMENTS

The Navy and Air Force will each have MRASM variants for their particular needs. The Navy land attack MRASM program is intended to improve the Navy's capabilities for standoff attack of ships, port facilities, naval supply centers, and other naval infrastructure hard-point or soft-area targets.

The Air Force's airfield attack MRASM is intended to aid the mission of gaining air superiority by denying use of enemy airfields and destroying aircraft support facilities. [Deleted].

The warheads under development are conventional and are designed to meet mission requirements as well as the physical constraints imposed by the missile and the requirement for maximum commonality with the basic TOMAHAWK cruise missile design.

IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 EST	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost ·
Medium-Range Air-to-Surface Missile (MRASM)										
PE 63369N			[							]
Development $	44.6	19.0								
Production $	-	-								
PE 64614F										
Development $	14.0	48.9				DELETED				
Production $	-	-								
PE 27164F										
Development $	-	-								
Production $	-	-	[							

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The development and production of conventionally-armed cruise missiles are consistent with US arms control policy. The MRASM would provide an improved conventional capability to disrupt such activities as airfield operations (accomplishing a mission curently performed by penetrating aircraft), to contribute towards the creation of maritime superiority required to put Soviet naval forces at risk, and to project forces worldwide. In general, conventional force improvement programs of which MRASM is a part, are meant to strengthen deterrence and regional stability. Since they enhance NATO's conventional posture they also support US arms control policy by making the necessity to resort to nuclear weapons in the initial phase of a NATO-Warsaw Pact conflict somewhat less likely. Also, by improving US capabilities worldwide, they further support deterrence.

B. Relation to Arms Control Agreements.

The SALT II Treaty, which was to have run through 1985, was signed on June 18, 1979, but has not been ratified. The SALT II Protocol was to have expired at the end of 1981.

A comprehensive interagency review of US strategic arms control policy is currently underway. While it is the position of this administration that the SALT II Agreement will not be ratified in its present form, the US has indicated that pending completion of this review, it will take no action that would undermine the

SALT II Agreement as long as the Soviets exercise the same restraint. There are several provisions of the SALT II Agreement pertinent to air-launched cruise missiles (e.g., definitions, range capabilities/determination, platform distinguishability for accountability purposes) which would have implications for US cruise missile programs if the treaty entered into force.

The major SALT II-MRASM implications are summarized below:

Implications of SALT II Range Restrictions.

The SALT II Agreement would have limited only those air-launched cruise misiles with fuel exhaustion ranges (max range possible when missile is flying in its standard design mode) of over 600 km. Since the fuel exhaustion range of the MRASM, when launched from an aircraft, is under 600 km, it would not have been considered a long-range cruise missile under the terms of the SALT II Agreement.

[Deleted].

Implications of SALT II Distinguishability Rules.

The SALT II Agreement would have required that MRASMs be distinguishable from long-range cruise missiles on the basis of externally observable design features. [Deleted]

[deleted].

The MRASM airframe is observably different from the Boeing AGM-86B ALCM airframe. As Table 1 indicates, the Navy MRASM is 27 inches shorter than the ground- and sea-launched versions of the TOMAHAWK Cruise Missile and incorporates a swept wing design. The Air Force MRASM is 13 inches longer than the GLCM/SLCM and has the same airframe. [Deleted].

[Deleted].

C. Effect on Current and Prospective Negotiations.

[Deleted]. Moreover, since MRASM is a medium-range, conventionally-armed system, it should not be subject to limitation in future negotiations on strategic systems.

D. Effect on Global and Regional Stability.

The effects of MRASM deployment upon global and regional stability are imprecise. By helping to neutralize the threat that Warsaw Pact aircraft pose to Western Europe, MRASM could have a positive effect on global and regional stability.

[Deleted].

E. Technological Implications.

The United States [deleted]. Neither the land attack nor the airfield attack MRASM configrations represent a wholly new type of weapon. Their lineage goes at least as far back as the V-1 "Buzz Bombs" of World War II and, more recently, the less advanced anti-ship cruise missiles possessed by the Soviet Union. The MRASM represents the integration of a series of improvements in a number of technologies. It is, therefore, doubtful that MRASM alone will have significant technological implications, but will contribute along with the remainder of the cruise missile family to developing a climate which could evoke responses from the Soviets and/or others.

Possible Soviet Responses.

[Deleted].

The Soviets currently have a substantial number of tactical air-launched cruise missiles, [deleted]

[deleted]. The Soviets have had several variations of anti-ship and short-range land-attack air-to-surface cruise missiles deployed for many years. While the Soviets, in response to the MRASM program, could decide to develop a cruise missile of similar size and capability, it is more likely that such an attempt on their part would be the result of their own military requirements.

[Deleted].

[Deleted]

[deleted].

Other Responses.

[Deleted].

While the increased capabilities of advanced cruise missiles might make their production militarily and politically attractive to some nations, it seems unlikely that, except in a few cases, such programs would be undertaken. [Deleted]. The current non-US systems could undoubtedly be upgraded, but the limited research, development and production bases of many nations, coupled with the high cost of developing advanced cruise missiles, make them an unattractive acquisition option for all but a select few. Manned aircraft are currently more readily available and are sufficiently flexible delivery systems to meet the present needs of most states.

Similarly, most smaller countries would not seek a conventionally-armed air-launched cruise missile because of the large numbers of cruise missiles which would be required for the same task as a smaller number of manned aircraft which possess some stand-off capability and can deliver greater payloads and more varied munitions.

Development of cruise missiles similar to the US MRASM could present formidable technical obstacles to many states. A country must possess the technology to develop lightweight, compact engines, or must otherwise acquire them. There is a further requirement for considerable sophistication in aerodynamics and micro-miniaturized guidance systems as vulnerability to air defense requires that cruise missiles follow the terrain at low altitudes in the terminal stages of flight. Moreover, if terrain contour matching is desired for high accuracy, a sophisticated reconnaissance and mapping capability would also be required. Should these missiles be designed as nuclear systems, there is the further problem of fabricating small nuclear weapons.

Recognizing that these and other technological barriers could be prohibitively expensive and difficult for many countries, it must be acknowledged that some countries may intend cruise missiles for less demanding missions (reduced accuracy requirements; penetration of less effective air defense systems) than those visualized by the United States. In this case, development of a relatively unsophisticated cruise missile may be seen as practical.

It is also possible that alternative methods may be achieved to overcome current technological barriers. [Deleted]

[deleted].

F. Potential Interaction with Other Programs.

In terms of power projection, the mission of the MRASM could include support of engaged friendly forces and deep interdiction. The Air Force's AGM-109H airfield attack MRASM would complement that role by destroying airfields, depots, and communications sites servicing enemy aircraft. In conjunction with surface-to-air and air-to-air defense systems, the AGM-109H MRASM could aid the mission of gaining and maintaining air superiority. Finally, the airfield attack MRASM could provide an improved capability to attack targets conventionally, thus enhancing NATO'S conventional posture, and, thereby making the necessity to resort to nuclear weapons less likely.

G. Verification.

Verification of compliance with provisions of the SALT II Agreement would require such monitoring tasks as determining ranges, and distinguishing MRASMs from long-range cruise missiles, (so that MRASMs do not become SALT-accountable as long-range cruise missiles). If the SALT II provisions were applicable into the future the following judgements apply:

- [Deleted].
- [Deleted]

[deleted].

- [Deleted].
- [Deleted].
- [Deleted].
- [Deleted].

It should be noted that if negotiated cruise missile constraints were more severe, future arms control agreements could conceivably require more encompassing and stringent cooperative measures in order to assure adequate verification.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The development and acquisition of conventionally-armed cruise missiles are consistent with US arms control policy. They offer the potential to help offset the serious threats posed by Soviet warships and Warsaw Pact aircraft to our ability to carry out wartime missions. In this sense, MRASM could enhance the credibility of our defense commitments abroad.

The land-attack MRASM provides an improved conventional capability to accomplish missions currently being performed by penetrating aircraft. As such, the deployment of MRASM could serve to enhance NATO's conventional posture, and, thus could make less likely NATO's resort to nuclear weapons in a NATO-Warsaw Pact conflict.

[Deleted].

CHEMICAL WARFARE

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
62622A	Chemical Munitions and Smoke Munitions
62706A	Chemical/Biological Defense and General Investigation
62734A	Medical Defense Against Chemical Agents
63615A	Lethal Chemical Munitions Concepts
63721A	Chemical Defensive Materiel Concepts
63751A	Medical Defense Against Chemical Warfare
63752A	Demilitarization Concepts
64610A	Lethal Chemical Munitions
64725A	Chemical Defense Materiel
65804A	DARCOM Ranges/Test Facilities
63745F	Chemical Warfare Defense
64601F	Chemical/Biological Defense Equipment
62764N	Chemical/Biological/Radiological Defense Technology
64506N	BW/CW Countermeasures
64604N	Chemical Warfare Weapons
Procurement	Chemical Defense Equipment Stockpile Maintenance

US ratification of the Geneva Protocol and the Biological Weapons Convention (BWC) indicates a US commitment to the objective of the complete, effective, and verifiable prohibition of all chemical weapons. The BWC commits the states which are parties to the convention to continue negotiations towards prohibition of chemical weapons. The US will continue to participate in efforts aimed at eventually concluding a chemical weapons prohibition.

From 1977 to 1980, interagency reviews resulted in Presidential decisions to maintain our chemical warfare (CW) deterrent retaliatory forces without force improvement. The House and Senate, at their own initiative, authorized partial funding for FY 1981 to construct the initial phase of an Integrated Binary Munition Production Facility. The Reagan Administration included funds in the FY 1981 Budget Supplemental to provide equipment for the binary chemical munitions facility. Congress subsequently authorized these funds. The decision to construct a binary facility is not a commitment to production. This is the first phase of a program which will allow production of binary chemical weapons in FY 1984 if the decision is made to do so.

No funds have been requested in the past for actual production of binary munitions, but FY 1976 authorization legislation requires prior Presidential certification and notification to Congress before binary weapons can be produced.

When the House/Senate Conference addressed BIGEYE funding ($1.87M) in the FY 1981 Revised Supplemental, the Conference Committee agreed to fund initiatives in chemical weaponry, but remained deeply concerned about the many unanswered questions surrounding the effort. Therefore, the Committee directed the Administration to determine the long-range costs of the CW modernization program and provide a country-by-country report from our NATO allies with respect to their official views on that long-range program. The Committee felt that the information provided so far had been insufficient. The Committee also believed it imperative that the Administration provide an overview of the mission-oriented requirements for the various binary weapons, as well as an arms control impact study of such requirements before further funding is approved.

The proposed FY 1983 CW Program (i.e., active RDT&E of both deterrent retaliatory and defensive CW programs; procurement of an improved protective CW capability; initiation of actions needed to modernize the US deterrent retaliatory capability and to dispose of the deteriorating chemical agent stockpile, and maintenance of chemical munitions) provides the basis for this analysis. This program supports the US objective of maintaining an adequate defensive and deterrent retaliatory capability, increasing the safety of the systems involved, as well as eventually concluding a complete and verifiable prohibition of chemical weapons production, development and stockpiling and contributes to negotiations by allowing the US to gain negotiating leverage in the area of chemical weapons arms control. The current program supports our existing, [deleted] chemical weapons deterrent retaliatory stockpile. The amount of retaliatory-related research and development now being funded provides a technological basis for evaluating defensive measures, as well as a basis for modernization of US CW deterrent retaliatory capabilities. The program also retains protective preparations signaling an intent to provide continued protection to our own personnel.

II. PROGRAM DESCRIPTIONS

A. Research, Development, Test & Evaluation.

The Army, as DOD Executive Agency for CW RDT&E, has responsibility for conducting a coordinated interservice RDT&E program to provide the essential technology base upon which the Services can develop chemical weapons and chemical defense systems on an individual or joint basis to meet their needs. [Deleted]. Building on this technology base, individual Services then fund engineering development programs to support their unique requirements. FIGURE 1 illustrates the interrelationship of the various CW programs.

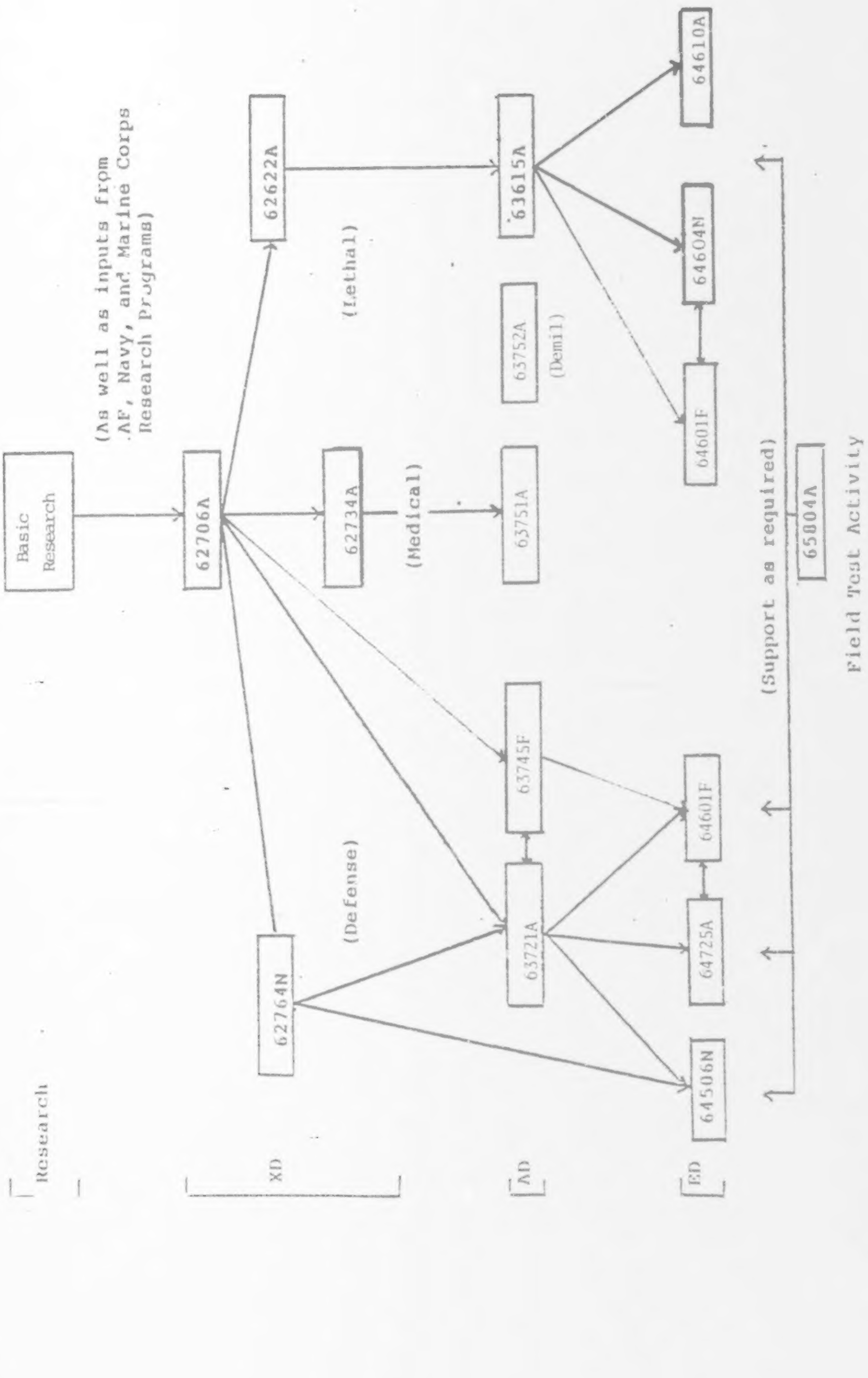
For the purpose of this analysis the CW program will be discussed using the following subgroupings: Technology Base, RDT&E in Defensive Materiel, Medical Research, Technical Support of Agent and Munitions Development, and Field Test Activity.

1. Technology Base.

This portion of the program would constitute about 24 percent of the FY 1983 effort.

PE 62706A Chemical Biological Defense (CBD) and General Investigation - This program element supports the entire DOD chemical defense technology base. Exploratory development (XD) of a broad spectrum of equipment concepts is being conducted: (1) to acquire a technological base to counter the threat posed by potential enemy chemical agent/munition systems; (2) to enhance knowledge in all aspects of physical defense, including warning, detection, identification, decontamination, individual and collective protection;

FIGURE 1.—CW RDT&E Program Flow


Research
XD
AD
ED
Basic Research
(As well as inputs from AF, Navy, and Marine Corps Research Programs)
62706A
62622A
62734A
62764N
(Defense)
(Medical)
(Lethal)
63745F
63721A
63751A
63752A
(Demil)
63615A
64506N
64725A
64601F
64601F
64604N
64610A
(Support as required)
65804A
Field Test Activity

(3) to investigate chemical compounds of military interest; (4) to evaluate protection countermeasures, avoid technological surprise, and uncover leads for new retaliatory chemical agents; and (5) to study agents and methodology for the training of troops. This knowledge is also usable in advancing the retaliatory chemical agent/munitions technology. This program also includes investigations supporting both defensive and retaliatory development in chemical dispersion and dissemination techniques, chemical agent systems process chemistry and pilot operations, searches for potential chemical agents, and toxicology of chemical agents. During FY 1983, it is planned to continue to assess the effectiveness of protective and detection systems against all potential threat agents in Service environments. Work on the identification and assessment of candidate persistent and nonpersistent training simulants will be continued. XD will continue on innovative concepts for decontamination, remote detection, monitoring and identification. In addition, XD will be completed on an individual decontamination kit.

PE 62622A Chemical and Smoke Munitions - Investigations under this Army project provide the essential exploratory effort in lethal, incapacitating and riot control agents and munitions and the total technology base for Department of Defense (no comparable work is done by the other Services): (1) Lethal Chemical Agents/Weapons; encompasses research activities associated with physical and analytical chemistry of potential lethal chemical systems; development of binary chemical agents of various degrees of volatility to be used with a variety of munition types with a resultant capability for air or ground delivery using standard and advanced weapon systems; and research leading to an understanding of phenomena which enhance the threat and effectiveness of these agents; (2) Incapacitating Chemical Agents/Weapons; includes the search for new, safe-to-handle incapacitants with the following properties: higher potency, shorter on-set time, shorter duration of effects, and percutaneous activity; development of effective means for exploitation of these agents; and identification of the physical and chemical characteristics of these agents; (3) Chemical Combat Support Systems; includes development and evaluation of new chemical compounds for riot control agents, development of concepts for their use and the establishment of the feasibility of munitions responsive to the concepts. Specific efforts for FY 1983 would include continued evaluation of: potential dual-purpose (inhalation and skin penetration) lethal agents adaptable to binary delivery;* weaponization concepts for air delivered bombs, air-deliverable mines, cruise missiles, Corps support weapons and extended range artillery projectiles; chemical agent manufacturing processes and environmental control mechanisms; and continued weaponization studies for potential incapacitating agents.

PE 62764N Chemical/Biological Defense Technology -

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* The binary concept is a process which provides for the formation of a lethal chemical agent from two non-lethal constituents by means of a chemical reaction occurring only during flight of the munition to a target. Additional safety and security are achieved by adding the second constituent at the time of preparing the munition for use.

This program element funds the Navy's efforts in a coordinated Joint Services Chemical, Biological, and Nuclear Radiation Research program. It provides for the formulation of the Navy's operational requirements and for the coordination of these requirements with the Army and Air Force for defense procedures and equipment. Based on RDT&E programs sponsored by other services, the following items would be evaluated in the shipboard environment in FY 1983 for compatibility with Naval functions and operations: (1) new joint service protective mask (complete evaluation and perform final testing), (2) non-corrosive, non-hazardous decontamination material for shipboard use; and (3) Canadian, German and British shipboard collective protection systems as possible candidates for US application. In addition, the interoperability of Navy and Marine Corps equipment and procedures when employed in ship-to-shore operation would be verified, aviation-associated and integrated fleet/shore base chemical/biological defense material requirements would be determined, and survivability and mission-keeping capability criteria for which chemical defense systems are to be designed would be refined. Programs will be continued for the development of electronic local (point) detector and indicator paints and coatings; decontamination solutions and protective coatings, air filtering devices for shipboard collective protection; and CB protective/flame resistant materials, garments and coatings.

2. RDT&E in Defense Materiel.

This portion of the program would constitute about 42 percent of the FY 1983 effort.

The programs included in this sub-category are directed toward the development of a full spectrum of equipment and materiel required to sustain operations in a chemical environment. More specifically they seek to provide: (1) improved chemical detection, warning and identification materiel and equipment; (2) effective individual and collective protection; and (3) the means to decontaminate personnel and equipment following a chemical attack. Specific efforts for 1983 are as follows:

PE 63721A Chemical Defensive Materiel Concepts - Advanced development (AD) would be completed in FY 1983 on the automatic liquid agent detector, the simplified collective protective system and the hybrid (combination ventilated face mask and positive pressure) collective protection system for armored vehicles. AD would be initiated or continued on the automatic chemical agent detection alarm, the individual decontamination kit, and a remote sensing chemical agent alarm.

PE 63745F Chemical Warfare Defense - This AD program, a new start in FY 1982, is designed to alleviate basic medical and operational problems associated with CW operations. The program will demonstrate improved technology solutions to enhance Air Force capabilities to sustain operations and handle casualties in a CW environment. The FY 1983 planned program would include the developmental test and evaluation of prototype aircrew respirators, resin filters, and liquid-cooled garments. Efforts will be initiated to: (1) develop a prototype vital signs monitor for use in air evacuation missions; (2) develop aircrew contamination control procedures; and (3) integrate chemical defense equipment with current life support equipment.

PE 64725A Chemical Defense Materiel - Engineering development (ED) would be initiated on the following: (1) an interior surface decontamination system for vehicles; (2) an improved training simulator; (3) an improved detector kit simulator for use with training simulants; and (4) the Large-Scale Decontamination Device (Jet Exhaust). ED would continue on: (1) the modular collective protection equipment (MCPE) applications to vans, shelters and associated equipment; (2) aerial and ground disseminators for chemical agent attack simulation; and (3) a universal decontaminant.

PE 64601F Chemical/Biological Defense Equipment - This program element contains all ED of Air Force-unique defensive equipment. (There is one project within the PE that funds certification on Air Force aircraft of the Navy BIGEYE binary chemical weapon -- see PE 64604N, Section II A.) The FY 1983 program will continue development of an area detection system. Also in FY 1983 the third generation aircrew protection system will reach ED, the improved collective protection and decontamination systems will undergo AD, and Air Force operational tests of the new joint-Service groundcrew protective mask will take place.

PE 64506N BW/CW Countermeasures - This program element is an ED program that will provide advance warning and automatic point detection of a CW agent attack and provide US Navy ships with a shipboard collective protection system option. Funds were approved in FY 1975 to develop a CW advance warning capability for US Navy ships utilizing the Forward Looking Infrared (FLIR) imaging principle. The detection of CW agents can be made with FLIR in its normal mode of operation. The major development effort is directed toward [deleted] CW agent identification and false alarm discrimination. It is planned that the chemical detection portion of this program would be completed in [deleted]. The automatic advance warning system will be comprehensively evaluated for detection, identification and discrimination capabilities in the at-sea and littoral environments for multi-ship application [deleted]. Shipboard installation of the automatic CW point detector, protective clothing and decontaminants will begin [deleted]. In addition, a shipboard chemical collective protection system preliminary design prototype for the LHA class ships will be installed and evaluated [deleted]. Other improvements in clothing, masks, detectors, immunization, simulants, alarms and collective protection continue.

3. Medical Research.

This portion of the program would constitute about 15 percent of the FY 1983 effort.

Major deficiencies exist in medical protection from and for treatment of CW exposures. There is no satisfactory antidote against certain atropine-resistant anticholinesterase threat agents. Antidotes for such agents comprise an important part of national defense against CW.

PE 62734A Medical Defense Against Chemical Agents - This restructured program supports the entire medical XD effort for the Army (the Executive Agency for this mission), and as such, must address joint Service requirements. The research efforts of this program are concerned with the XD necessary to solve immediate and anticipated problems concerning the prevention, prophylaxis, treatment and management of CW casualties. This integrated program provides the critical basis for minimizing CW casualties, assuring their rapid return to duty, and thereby reducing the impact on combat resources. The FY 1983 program would continue safety and efficacy testing of candidate CW agent antidotes, prophylaxes and therapeutics. Development of mass CW casualty management procedures will be continued. Development of new materiel required to enhance CW casualty survivability and expeditious return to duty will be continued.

PE 63751A Medical Defense Against Chemical Warfare - This, a new start in FY 1982, represents the US Army Medical Department's current AD program for medical defense against chemical agents. The effort is to provide an effective medical system for maximizing safety and survivability of the soldier on the CW battlefield. Initial work will center on three areas: soldier chemical agent antidote development; patient decontamination; and medical management of CW casualties. During FY 1983, drug development efforts will be initiated and development of field rescusitative materiel will continue. In addition, new programs will be established for the toxicological assessment of decontamination materiel, and advanced development of a patient decontamination shower.

4. Technical Support of Agent and Munitions Development.

This portion of the program would constitute 11 percent of the FY 1983 effort. The programs included in this subgrouping support the DOD development of deterrent retaliatory and combat support chemical weapons.

PE 63615A Lethal Chemical Munitions Concepts - The objective of this Army program is to conduct AD on binary lethal chemical agent munitions which have advanced from XD and exhibit potential for casualty production through either the respiratory tract and/or penetration of environmental and protective clothing. Small-scale pilot units are designed and installed to obtain process engineering data for application to future production facilities. Chemical agent munition concepts that employ the binary principle are evaluated. No comparable work is done by the other services on lethal chemical agent processes. During FY 1983 the agent fill (intermediate volatility agent (IVA) versus more persistent lethal nerve agent) for the Multiple Launch Rocket System (MLRS) will be selected and the validation phase of the testing will be initiated. Munition fabrication for the 8-inch IVA projectile will be completed. Completion of AD of the chemical warhead for the MLRS is scheduled for FY 1985; FY 1983 for the 8-inch IVA projectile.

PE 64610A Lethal Chemical Munitions - The objective of this program is to conduct ED on new binary lethal chemical weapons and equipment for the Services. (The objectives of this program were changed in 1970 and currently support only the development of chemical munitions which produce the toxic agent via the binary mode.) The binary design would provide for maximum safety in handling, storage, transportation and demilitarization and at the same time optimize state-of-the-art advances to insure maximum effectiveness on-target. Development of the 155mm Binary Projectile (M687), which generates the non-persistent nerve agent GB-2, was completed during 1QFY 1977. ED of the 8-inch and MLRS Binary IVA projectile will continue in FY 1983.

PE 64604N CW Weapons (BIGEYE) - This program would provide for development of the BIGEYE, a binary spray bomb developed as a joint Service project with Navy as lead Service and Air Force as participating Service. Like the other binary systems, production is contingent upon a Presidential decision and Congressional funding. BIGEYE would be the first aircraft-delivered weapon to generate persistent agent (VX-2) from two non-lethal chemicals. Shipboard handling and storage would be permitted with this system whereas current chemical weapons are not normally authorized in peacetime aboard ship for safety reasons. The FY 1983 planned program completes most technical and operational tests and evaluations and initiates preparation of the Technical Data Package in readiness for a possible production decision. Development is to be completed [deleted].

Funds were requested and provided in the FY 1979 through 1982 budgets for maintenance of the existing inventory of CW munitions. The FY 1983 request contains $19.5 million for maintenance of chemical munitions.

5. Field Test Activity.

This portion of the program would constitute about one percent of the FY 1983 effort.

PE 65804A DARCOM Ranges/Test Facilities - Dugway Proving Ground (DPG), Utah, is an installation of the US Army Test and Evaluation Command, a major subordinate command of the US Army Materiel Development and Readiness Command. DPG has a unique mission to plan, conduct, and report on tests that assess the military value of chemical weapons and defense systems and related procedures during and after exposure. No live agent weapon system testing has been conducted since 1969. DPG also conducts research, development, laboratory tests, field tests and investigations necessary to support the assigned mission, including meteorology, ecology, epidemiology and test technology. DPG operates under a uniform DOD reimbursement policy for major ranges and test facilities wherein users of these facilities pay all direct test costs and the facility itself finances the indirect costs of testing and the costs of operating and maintaining the facility. Scheduled major tests for FY 1983 includes the Jet Exhaust Decontamination/Smoke System. Other Service chemical-related studies will be conducted as requested.

B. Procurement.

The technical quality of much of US standardized and fielded CW warning and protective equipment represents the state-of-the-art. [Deleted]

[deleted]. Procurement programs currently proposed by DOD for substantial quantities of standardized equipment would provide an improved protective posture enabling deployed forces to operate in a CW environment [deleted].

Significant increases were made to the FY 1979-81 programs to accelerate chemical protective equipment development and acquisition. There have been problems in reestablishing the production base for CW-related items. The major problem in the acquisition process is that the relatively small program quantities for certain equipment do not attract large industry interests, procurement regulations hamper rapid response, and the small manufacturers who receive contracts experience numerous problems in material supply and quality control.

The Army procurement program for the 16 divisions of its active force provided for achievement of an individual-protection capability [deleted] and will provide for replacement of equipment to be consumed by an increased annual training program and by shelf life losses in FY 1982-83. The Army is equipping its 8-division reserve components with priority to early deploying divisions.

[Deleted] eight divisions are to be equipped by [deleted].

The Army has planned fairly substantial purchases of non-consumable items (alarms, shelters, etc.) for its 24-division total force. Most item purchases would be completed [deleted]. Equipment requirements for [deleted] war-reserve stocks have been identified and will be funded concurrently with initial issue requirements.

Air Force CW defense equipment procurement now provides a [deleted] capability for forces [deleted]. Designated mobility forces including Air Force Reserves and Air National Guard have received initial equipment stocks. Equipment includes: aircrew and ground crew, and special-team protective ensembles; detection and alarm devices; and decontamination equipment. [Deleted].

Chemical defense equipment is provided on all Navy ships. It consists of personal protective masks, impregnated clothing, water washdown systems to flush off contaminants, decontamination stations, medical antidotes and chemical agent detectors. This equipment is provided during the fitting-out period as a standard part of total costs. Organizational maintenance funds are provided for subsequent repair and replacement, as required. Therefore, the Navy does not ordinarily differentiate between CW protective equipment and other items in its funding programs. Deficiencies remain in the areas of [deleted]. Actions are in progress to develop definitive plans and programs to equip Naval forces [deleted]. If shipboard evaluation is successful, the new Army/Air Force Chemical Agent Detection and Alarm Set (ionization point detector) or other candidate detector will be installed in Navy ships [deleted] as will be [deleted].

Marine Corps chemical procurement parallels US Army procurement because of the two Services' common interest in ground combat requirements. Since the US Army is the executive agent for joint Services chemical development, the Marine Corps closely monitors Army RDT&E activity to ensure that specific Marine Corps requirements are satisfied. Recently developed/improved chemical defense equipment, e.g., detectors/alarms, protective clothing, decontamination kits, and antidotes, have been programmed or are being processed for procurement [deleted]. The Marine Corps has programmed $104 million for procurement items during FY 1983 through FY 1987. Current developmental items satisfying Marine Corps requirements would be placed into the procurement cycle as soon as available for field use.

C. Integrated Binary Munition Production Facility.

The facility would be of modular construction -- designed for separate binary ingredient production and separate modules for the loading, assembling and packaging of both artillery projectiles and the larger items such as bombs or missile warheads. The initial module (155mm GB projectile), which has been authorized and funded by the Congress, includes basic utilities (power, water, waste treatment) and a portion of the security and safety equipment (fencing, lighting, intrusion alarms) for follow-on construction. Plans also exist for modules for the BIGEYE binary bomb and other follow-on systems. The present cost estimate for building the first two modules is [deleted]. A full binary program would result in the capability for an adequate stockpile of proper size, weapon and agent mix. The cost of such a modernization of the CW stockpile would be [deleted].

D. Disposal.

Disposal cost of the present stockpile, mainly because of environmental restrictions, will be a significant expense.

The Defense Science Board in its review of the Chemical Warfare Program in the summer of 1980, recognized the demilitarization problem as a national issue requiring significant resources. As a result, a "Long Range Chemical Demilitarization Concept Study" has been prepared and will be forwarded to the Congress per their request. It is estimated that 20 years and $2.7 billion would be required to demilitarize the current stockpile.

Of immediate concern to the Army is the requirement to dispose of sizeable quantities of obsolete toxic chemical agents and munitions being stored on Johnston Atoll in the Pacific and incapacitating agent BZ at Pine Bluff Arsenal, Arkansas. Construction of demilitarization facilities at both installations is programed for 1984.

FY 1983-1987 funds required for demilitarization are shown in Table 1:

TABLE 1: FY 1983-1987 Demilitarization Funds ($M).

	FY83	FY84	FY85	FY86	FY87	TOTAL
OMA	60.9	62.4	98.1	152.0	160.4	533.8
MCA	-	82.7[1]	-	53.6[2]	-	136.3[3]
R&D	12.8	13.9	10.0	7.6	-	44.3
Total	73.7	159.0	108.1	213.2	160.4	714.4

[1] Includes $9.1M MCA for BZ and $73.6M MCA for Johnston Island demilitarization facilities.

[2] Funds to be used to construct demilitarization facilities at four CONUS sites to expedite M55 rocket disposal.

[3] MCA dollars have been adjusted to reflect inflation.

In order to provide the improved technology necessary to demilitarize efficiently existing stockpiles of obsolete chemical munitions and agents, and eventually the entire current chemical stockpile, the Army initiated PE 63752A, Demilitarization Concepts, in FY 1982. The primary thrust of this program will be directed toward identifying alternative agent destruction technologies for application to chemical demilitarization process design. For FY 1983, detailed evaluation of alternative agent destruction processes will be completed. Pilot design will commence for those technologies offering the most benefit and least risk for incorporation into planned chemical demilitarization facility design. Prototype advanced munitions processing equipment will be evaluated. Prototype environmental monitoring systems will be designed and fabricated. Pilot-scale demilitarization waste disposal demonstrations will be initiated.

III. STATED MILITARY REQUIREMENTS

[Deleted]. US capabilities and commitments are presented in detail below.

A. US CW Objective.

The objective of the US CW program is to improve defensive and deterrent retaliatory capabilities against the use of chemical weapons while working to achieve a complete and verifiable ban on their production, development, and stockpiling. As part of a credible and effective deterrent, the US seeks to achieve an adequate CW warning and protective capability and the ability and means to retaliate with chemical weapons in such a manner as to neutralize the advantages gained by enemy use of CW and to seek termination of the use of chemical weapons at the lowest level possible.

Recent DOD assessments, as well as those of past years, have found [deleted] weaknesses in the US CW posture, considering the continued Soviet emphasis on CW [deleted].

B. Soviet and Warsaw Pact CW Capabilities.

A large asymmetry exists between the US and USSR in chemical weapon capabilities. Soviet military doctrine includes the use of chemical weapons. Of more significance, the Soviet forces are the best prepared and equipped in the world to operate in a CW environment produced either by an enemy or themselves. The Soviets have operational chemical weapon stocks, [deleted]. They also have a wide range of weapon systems capable of delivering chemical agents. The Soviets have devoted more resources than the US to Chemical/ Biological/Radiological (CBR) defense/protection, reflecting concern for the ability of their forces to operate in a CW environment. For example, new equipment fielded by Soviet forces (new armored personnel carriers, tanks, reconnaissance vehicles, some trucks, and various types of support equipment) is provided with modern filtration and protective systems. Some of the non-Soviet Warsaw Pact forces have produced and acquired similar equipment. CBR training for WP forces is extensive and frequent. [Deleted]

[deleted]. These measures enable these forces to operate in a CW environment more effectively than US/NATO forces.

Based on the analysis of all available evidence, [deleted]. Since 1976, there have been numerous reports on CW use in Southeast Asia. These include information on probable Soviet-sponsored use of chemical agents in Laos and Kampuchea indicating that several agents had been used and that as many as several thousand people may have died. [Deleted]. Analysis of data from Afghanistan indicates use of riot-control agents, incapacitants, and lethal agents by Soviet forces. Recent analysis and intelligence indicates good evidence of mycotoxin use in Kampuchea and Laos. [Deleted]. Overall, evidence on the role of the Soviets [deleted]. Although these conflicts present situations different from what could be expected in a war in Europe, the available evidence suggests that chemical warfare remains an intrinsic part of Soviet military strategy.

C. Impact of CW Use on US Forces.

Chemical attacks would seriously degrade all aspects of tactical combat operations [deleted]. Logistic and host nation support provided to the battlefield commander would be drastically reduced in a contaminated environment. [Deleted]. Even when protective measures are adopted to save lives, degradation in the performance of the military mission caused by these measures can be as high as [deleted].

The effect would be doubly severe, if NATO forces alone were subject to this attack without the enemy being equally impeded by chemical attack on his first and second echelons and supporting force structure. The need to deter the use of chemical warfare in any conflict is critical.

D. CW Protective Program.

CW protective capabilities are necessary to ensure that conventional and theater nuclear forces can survive and operate in a chemical environment. The existence of a credible Soviet CW program dictates that the present US RDT&E protective program be continued to allow for the development of an effective protective posture. A protective capability also requires highly trained, properly equipped and motivated forces and is needed regardless of whether or not we have a retaliatory capability.

E. In-Kind Retaliation.

An in-kind retaliation capability is viewed by many as the most credible and effective specific deterrent presently obtainable against Soviet use of chemical weapons. Chemical weapons used in a retaliatory role are an effective non-nuclear counteraction that could offset most of the advantages an enemy might expect to gain by CW offensive actions and places his forces in the same degraded posture as the defender. Defense/protective measures alone cannot constitute a credible deterrent given the operational degradation that accompanies their use and the fact that protective measures, even if available, are frequently degraded by normal combat conditions. In NATO Europe, the threat of retaliation in-kind is consistent with the direct defense option of the strategy of flexible response. A threatened retaliatory use of chemical weapons might be more credible and less escalatory than a threat to use nuclear weapons, as well as providing sufficient time for political and diplomatic efforts to terminate the conflict prior to crossing the nuclear threshold.

The allies have committed themselves to improving their protective capabilities under the Long-Term Defense Plan. [Deleted].

1. Present US CW Retaliatory Capabilities.

There has been an increasing [deleted]. The policy requires that US forces possess a credible and effective CW retaliatory capability if deterrence fails. [Deleted].

As previously reported, current US inventories of ready-to-issue and repairable lethal chemical munitions [deleted].

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* Repairable munitions are unserviceable munitions which can be brought to serviceable condition by various maintenance operations such as replacing unserviceable explosive components, inserting explosive components, de-rusting, remarking of containers, repackaging, etc. During the conduct of these operations, which includes an inspection of each round, some munitions will be found to be unrepairable. "Ready-for-issue" munitions are those in serviceable condition with all explosive components (bursters and supplementary charges) uploaded.

[Deleted].

The current maintenance plan primarily places emphasis on [deleted].

As weapon systems are phased out, or become obsolete as a result of changes in tactics and doctrine, munitions for these systems [deleted] will be placed in a category awaiting demilitarization. In the interim, as long as applicable delivery systems are in the inventory, and these munitions are safe to use, they should be maintained in order to optimize the effectiveness of the current deterrent retaliatory stockpile. Thus, for these reasons, by the late 1980s, [deleted] of the present [deleted] will remain in ready for issue and repairable lethal chemical munitions. [Deleted].

2. Stockpile Improvements.

Although funds have been provided for the construction and equipping of the Phase 1 binary chemical munitions facility, no authority has been granted relative to production of binary chemical munitions. The construction is being undertaken now to ensure that a facility will be available should a production decision be made.

IV. FUNDING * ("then year" $ in millions)**

	FY 81	FY 82	FY 83	FY 84 (est.)	FY 85 to Completion	Total Dev.	Total Proc.	Total Units	Unit Cost	Total Program Cost
Development $										
Technical Base										
61102A Def Rsch Sciences A 71A	2.4	6.4	5.1	3.8	Cont	NA	NA	NA	NA	NA
62622A Cml Mun & Cml Cmbt Spt	7.3	18.5	9.8	11.8	Cont	NA	NA	NA	NA	NA
62706A CB Def & Gen Invest	13.2	22.9	29.6	48.3	Cont	NA	NA	NA	NA	NA
62764N C/B Def Tech	0.7	1.8	1.8	2.5	Cont	NA	NA	NA	NA	NA
SUBTOTAL	23.6	49.6	46.3	66.4						
Defense Materiel										
63721A Cml Def Mat Concepts	17.4	20.0	26.5	28.8	Cont	NA	NA	NA	NA	NA
63745F CW Def	-	4.0	4.9	4.7	Cont					
64725A Cml Def Mat	17.4	37.7	26.0	45.3	Cont	NA	NA	NA	NA	NA
64506N BW/CW Countermeasures	3.7	7.7	8.4	8.4	Cont	NA	NA	NA	NA	NA
64601F C/B Def Equip	8.9	8.8	16.3	16.3	Cont	NA	NA	NA	NA	NA
SUBTOTAL	47.4	78.2	82.1	103.5						
Medical Research										
62734A Med Def against Cml Agts	14.4	25.8	26.9	37.1	Cont	NA	NA	NA	NA	NA
63751A Med Def against CM) Warfare	-	-	2.9	39.6	Cont	NA	NA	NA	NA	NA
SUBTOTAL	14.4	25.8	29.8	76.7						
Agent and Munitions Develop										
63615A Lethal Cml Mun Concepts	0.1	8.2	13.7	20.4	Cont	NA	NA	NA	NA	NA
64610A Lethal Cml Mun	-	2.2	-	3.6	Cont	NA	NA	NA	NA	NA
64604N CW Weapons	-	7.5	8.0	3.5	Cont	NA	NA	NA	NA	NA
SUBTOTAL	0.1	17.9	21.7	27.5						
Field Test Activities										
65710A Joint Test	0.7	1.4	1.4	2.2	Cont	NA	NA	NA	NA	NA
Demilitarization										
63752A Demil Concepts	-	9.5	12.8	13.8	Cont	NA	NA	NA	NA	NA
Total Development	86.2	182.4	194.1	290.1						
Procurement - Chemical Defense***	125.1	307.4	404.8	632.8	Cont	NA	NA	NA	NA	NA
Stockpile Maintenance	4.1	5.3	19.5	16.4	Cont	NA	NA	NA	NA	NA

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* Includes only CW funding wherever programs include BW or other activities.
** Department of Defense
*** Includes operation and maintenance, military construction, and war reserve.

V. ANALYSIS

The proposed FY 1983 CW Program (i.e., active RDT&E of both deterrent retaliatory and defensive CW programs, procurement of an improved protective CW capability, initiation of actions needed to modernize the US deterrent retaliatory capability and to dispose of the deteriorating chemical agent stockpile, and maintenance of chemical munitions) provides the basis for this analysis.

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The US CW program is consistent with US arms control policy. The US is committed to the eventual objective of a complete and verifiable prohibition of all chemical weapons. Specific arms control options in CW are being reviewed as part of the Administration's overall examination of international security issues. However, in the absence of satisfactory international agreements to eliminate the threat of CW, [deleted]. Congressional and Administration actions to construct and to equip Phase 1 of a binary CW production facility do not represent a decision to place greater emphasis upon chemical warfare but reflect overall US national security policy -- the deterrence of war. They represent a necessary step to increase the effectiveness of the US policy of providing a credible and effective deterrent retaliatory capability, and so that the US can gain negotiating leverage in the area of CW arms control. These actions are fully consistent with, and complementary to, the pursuit of an eventual comprehensive and verifiable ban on chemical weapons and the US policy of no first use of chemical weapons.

B. Relation to Arms Control Agreements.

The US is not constrained by international law nor party to any treaty or other legal obligation that would inhibit the development, production, stockpiling or deployment of chemical weapons.

The Geneva Protocol of 1925, to which the United States acceded in 1975, in effect, prohibits the first use in war of asphyxiating, poisonous, or other gases, and of bacteriological methods of warfare,* because some signatories, including the US and USSR, reserved the right to retaliate in-kind after first use by another signatory. The Protocol does not prohibit development, stockpiling or production of chemical weapons.

While the US is legally bound not to use chemical weapons first in war, the US maintains a chemical weapons capability for deterrence and for retaliatory purposes. The conduct of research in retaliatory-related CW areas and the initiation of actions needed to improve the deterrent retaliatory stockpile provides a base for reestablishing the credibility and effectiveness of the US CW deterrent retaliatory capability. In addition, this retaliatory related CW research also provides a base for the prevention of technological surprise and allows evaluation of the vulnerability of US forces and equipment and improves the CW arms control negotiating position of the United States.

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* The United States has consistently interpreted the Geneva Protocol as applying to lethal or incapacitating chemical agents, and not to riot control agents. The majority of states party to the Protocol make no such distinction, and consider the first use of riot control agents in war to be covered by the prohibition in the Geneva Protocol. In seeking Senate advice and consent to ratification of the Protocol, the President declared that, as a matter of policy, the US would not be the first to use riot control agents in war, except in defensive modes to save lives, subject to Presidential approval.

Efforts to improve CW protection capabilities are not constrained by any treaty or other legal obligation.

C. Effect on Current and Prospective Negotiations.

The proposed FY 1983 US CW program described in Section II of this ACIS is consistent with US participation in efforts to attain a complete, effective and verifiable chemical weapons agreement.

The US approach to CW arms control has been to seek a comprehensive prohibition on the production, stockpiling, acquisition or retention of CW agents and munitions. Development of CW agents or munitions would be prohibited, but development of means of protection against chemical attack would be permitted. Existing stocks of CW agents and munitions would be destroyed over a period of ten years. All facilities designed or used for production of prohibited chemicals would be declared and immediately closed down and subsequently destroyed. However, under appropriate controls such a facility could be used for agent/munition destruction operations. The disposition of declared facilities and the destruction of declared stocks would require on-site verification under independent, international auspices. Although full implementation of such a ban could take at least ten years after coming into force (time required for destruction of stocks), in the long term an adequately verifiable CW agreement might eliminate significant risk to US/NATO forces posed by Soviet CW capabilities and prevent further proliferation of chemical weapons.

Our allies support efforts toward attainment of a complete, effective and verifiable chemical weapons agreement.

Bilateral US-USSR negotiations on a comprehensive chemical weapon prohibition began in 1977 and stalled in 1979 over verification issues. No bilateral negotiations have been held since 1980.

In multilateral fora, discussions on a chemical weapon agreement have been underway since the late 1960s. With the beginning of US-USSR negotiations, multilateral activity waned to some extent, although interest in a CW prohibition on the part of our allies and others continued.

Over the last two or three years, multilateral interest in CW discussions has intensified. During its spring 1980 session, the Committee on Disarmament (CD) established an ad hoc working group whose mandate was limited to identifying the issues which would have to be discussed in the negotiating of an eventual CW prohibition and to obtaining states' views on these issues, and did not permit negotiation of treaty language. The Working Group's mandate was renewed for the 1981 session. [Deleted].

[Deleted].

[Deleted].

[Deleted].

[Deleted]

[deleted].

The Administration [deleted].

[Deleted].

We must also note that a US decision [deleted].

D. Effect on Global and Regional Stability.

The United States believes that CW capabilities play an important role in deterrence and defense. NATO's strategy of flexible response requires a variety of options in support of military and diplomatic efforts to bring a conflict to early termination on terms acceptable to the United States and its allies. Continued retaliatory RDT&E efforts and initiation of actions needed to improve the US deterrent retaliatory capability, to procure an improved protective capability and to gain leverage in arms control negotiations, should contribute to stability. Continued reliance on the existing [deleted] stockpile could, however, encourage instability by increasing the interest of other countries to acquire and employ chemical weapons.

[Deleted].

[Deleted].

E. Technological Implications.

[Deleted].

[Deleted].

F. Potential Interaction with Other Programs.

Chemical weapons are important to deterrence as a link between conventional capabilities and theater nuclear weapons. In the current environment of [deleted].

[Deleted] the capabilities of conventional forces and chemical retaliatory capabilities will be significant determinants of the nuclear threshold. For this reason, NATO has emphasized flexible response to preclude the necessity of nuclear weapons use for war fighting.

C. Verification.

The Soviet Union can verify easily that the US is actually conducting the CW program which we openly claim, i.e., active RDT&E of both retaliatory and defensive CW programs, initial construction of a binary production facility, and procurement of an improved protective CW capability. [Deleted].

[Deleted].

For the above reasons, [deleted]

[deleted].

Efforts under way [deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Elimination of the use of chemical weapons is a national security objective of the United States. The use of mycotoxins and CW in SEA and Afghanistan underscores the importance of this objective. US policies to achieve this objective have two interrelated and complementary aspects. The first deals with chemical weapons arms control and disarmament, the second with military strategies and capabilities to deter and, if necessary, defend against chemical warfare. Essentially, chemical weapons arms control is to be pursued, and appropriate military capabilities are to be maintained, until such time as effective international agreements remove existing and future threats of chemical warfare.

[Deleted]. Active RDT&E of both deterrent retaliatory and defensive CW programs, procurement of an improved CW protective capability and the initiation of actions needed to modernize the [deleted] CW deterrent retaliatory capability are necessary for deterrence of Soviet use of CW and for our defense. They are consistent with US arms control policy and, by helping to eliminate the existing large asymmetry in US-USSR CW capabilities, will improve the US CW negotiating leverage by providing increased incentive for the Soviets [deleted].

DIRECTED ENERGY PROGRAMS

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
63605F	Advanced Radiation Technology
62601F	Advanced Weapons: Laser Applications and Particle Beam Technology
64406F	[Deleted] Project 2135
63603F	Space Laser Program
62735N	High Energy Laser Technology
62768N	Directed Energy Technology
62307A	Laser Weapon Technology
63314A	High Energy Laser Components
62711E	Experimental Evaluation of Major Innovative Technologies: Projects EE-7, EE-8, and EE-12
62301E	Strategic Technology/Project ST-3, HEL Technology
62707E*	Particle Beam Technology

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* This program now includes research previously sponsored by the US Army under PE #63304A, "BMD Advanced Technology Program: Particle Beams," and by the Defense Advanced Research Projects Agency under PE #61101E, "Defense Research Sciences: Particle Beams."

The above programs represent an effort to explore and, if feasibility is proven, to develop the potential of directed energy (DE) weapons.

Extensive studies have shown that, if actually developed, DE weapons would have potential mission advantages over many existing types of weapons against missiles, aircraft and spacecraft targets. Such advantages flow mainly from the extremely high delivery speed of the damaging energy to the targets. This permits little opportunity for evasive maneuver by the target and thus the use of multi-shot and rapid retargeting capabilities against saturation attacks.

While high energy lasers and particle beams differ in state of development and in the technology required to realize them, they have potential for weapon systems of similar operational characteristics. Moreover, if they can be developed as weapons, they could have similar implications for the future of the Anti-Ballistic Missile (ABM) Treaty, possible anti-satellite (ASAT) negotiations, and space defense issues generally.

II. PROGRAM DESCRIPTIONS

A. The DOD High Energy Laser Program.

The DOD high energy laser (HEL) program is an integrated effort of the Services and the Defense Advanced Research Projects Agency (DARPA). Its purpose is to continue developing the technology for laser devices (beam generators), pointing and tracking (beam control) and fire control systems, and to demonstrate the feasibility and potential of high energy lasers as weapons. The program is structured to demonstrate, by the mid-1980s, whether work on advanced development prototypes should begin. If such protoypes are demonstrated as feasible by the early 1990s, laser weapons could be available in the late 1990s for selected offensive and defensive applications such as defense of ships, aircraft, high value ground targets or satellites, destruction of ground and airborne sensor systems, and ballistic missile defense. The following paragraphs (B. through K.) discuss the programs of the individual Services and DARPA.

B. Program Element #63605F - Advanced Radiation Technology.

1. Capabilities. The goals for the Air Force program are to demonstrate [deleted]. Major on-going efforts include:

a. Airborne Laser Laboratory I (ALL-I).

The ALL-I, a specially equipped transport aircraft (NKC-135), has been designed to carry HEL equipment [deleted] from an airborne platform. The design includes a [deleted] gas dynamic laser [deleted]. This test bed began in FY 1981 to be used in experiments [deleted]

[deleted]. Later, a radar acquisition and firing system that is being developed may be added, and the ALL-I would be used in experiments [deleted].

b. Airborne Laser Laboratory II (ALL-II).

The ALL-II program is separate and distinct from the ALL-I. It would use a large jet aircraft and demonstrate HEL weapons [deleted].

c. Short Range Technology (SRT) Program.

The SRT program is structured to evaluate the potential of near-term laser technology, [deleted].

d. Intermediate Range Technology (IRT) Development Program.

This program is concentrated on the critical technology [deleted] applications, [deleted]. Included are the development of: [deleted]

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* A microradian is an angular measure which spans one centimeter at ten kilometers distance. It is approximately one-fifth of an arc second.

[deleted].

e. Mid Range Applied Technology (MRAT).

The objective of this program is to demonstrate the [deleted]. The program would include advanced beam control technology development and an integrated laser system demonstration. [Deleted].

f. Advanced Development/Support (AD/S).

Development of advanced concepts in adaptive optics, laser devices, beam control, and optical components would be pursued under this effort.

2. Program Status. The status of the above programs is as follows:

a. ALL-I.

[Deleted] testing of the ALL-I system in flight [deleted].

b. ALL-II.

[Deleted]

[deleted].

c. SRT.

Development of [deleted].

d. IRT

[Deleted].

e. MRAT.

Design, procurement and technology development activities would continue [deleted].

f. AD/S.

The development and expansion of the technology base for high energy lasers is being pursued with increasing emphasis on [deleted] advanced [deleted].

C. Program Element #62601F - Advanced Weapons: Laser Applications.

1. Capabilities. This program explores the technical feasibility and operational practicality of lasers as weapons to fulfill specific USAF mission requirements. Studies are performed to include advanced laser device concepts, advanced [deleted] investigation of high energy laser effects, and studies and analysis of potential applications of high energy laser systems.

2. Program Status. [Deleted].

D. Program Element #64406F - [Deleted] Project 2135.

1. Capabilities. This program supports research related to the use of high energy lasers [deleted]. Systems definitions are prepared such that should the technology mature sufficiently, the Air Force will be in a position to proceed with a full-scale development.

2. Program Status. The May 13, 1981 Secretary of Defense cover letter transmitting the Report to the Congress on Space Laser Weapons recommends that DOD's current $100 million per year in space laser development be augmented to the extent of approximately $50 million per year starting in FY 1982. A new program element, PE #63603F, has been established and all space-

based laser activity conducted under Project 2135 is being transferred to this new program.

E. Program Element #63603F - Space Laser Program.

1. Capabilities. The new Air Force Space Laser Program is designed [deleted]. The new program will:

a. [Deleted].

b. Develop detailed concept definitions for the more promising laser weapon options. Investigate technological and operational aspects with [deleted].

c. Establish realistic bounds on space-based laser weapon lethality in various possible applications.

d. [Deleted].

e. Reduce uncertainties in basic laser system technology, [deleted] and cost and schedule estimates.

f. [Deleted].

2. Program Status. Air Force planning activities are underway. In FY 1983, concept definition efforts, lethality assessments and space laser technology programs will be initiated. A joint DARPA/AF program plan is being prepared.

F. Program Element #62735N - High Energy Laser Technology.

1. Capabilities. The objective of this program [deleted] is to demonstrate the utility of the HEL in a number of potential naval applications [deleted]. This would be achieved by developing and integrating the necessary components in a test bed to demonstrate that the subsystems work effectively together. This integrated test bed would then be used [deleted] at White Sands Missile Range using targets and scenarios that are appropriate to all Services' needs. The subsystems under development include the laser [deleted] an optical pointer/tracker, and an automatic aimpoint selection and maintenance subsystem.

2. Program Status. The MIRACL completed acceptance testing in FY 1981. During FY 1982 and FY 1983, this [deleted].

G. Program Element #62768N - Directed Energy Technology.

1. Capabilities. This program is designed to

support research on advanced directed energy technologies and on system concepts for a variety of military applications.

2. Program Status. For FY 1983, this program would support research in HEL (including [deleted] charged particle beams, high power microwaves, and [deleted] technology. Experimental tests would begin using [deleted]. High power microwave developments would include further work on devices and on experiments and theory related to atmospheric breakdown. Also, research would be conducted on the key components of directed energy technologies, e.g., [deleted].

H. Program Element #62307A - Laser Weapon Technology.

1. Capabilities. This program explores potential HEL uses in weapon systems for a variety of Army mission applications, and advances the HEL technology base. Potential applications being pursued are [deleted]. The technology base advancement entails research in laser science and quantum physics.

2. Program Status. [Deleted].

I. Program Element #63314A - High Energy Laser Components.

1. Capabilities. This program element funds two feasibility demonstrations beginning in FY 1983 for potential HEL uses in weapon systems for a variety of Army mission applications.

2. Program Status. [Deleted].

J. Program Element #62711E - Experimental Evaluation of Major Innovative Technologies: Projects EE-7, EE-8, and EE-12.

1. Capabilities. The listed projects are [deleted] to demonstrate key elements of [deleted] a [deleted] laser [deleted] system. [Deleted]

[deleted].

a. [Deleted] Project EE-8). [Deleted].

b. [Deleted] Project EE-12). [Deleted].

c. [Deleted] Project EE-7). The objective of this program is to develop and test [deleted]

[deleted].

2. Program Status. For FY 1983, the planned activities for each of the projects is as follows:

a. [Deleted].

b. [Deleted].

c. [Deleted].

K. Program Element #62301E - Strategic Technology/Project ST-3, HEL Technology.

1. Capabilities. [Deleted] applications are the focus of the DARPA efforts in the DOD HEL program. [Deleted]

[deleted].

2. Program Status.

[Deleted].

[Deleted]

[deleted].

L. The DOD Particle Beam (PB) Program.

Weapons based on particle beams of high currents and high energies could, if feasibility is demonstrated, serve as a possible alternative or supplement to other weapon systems. Also, particle beams will continue to have many non-weapon applications (e.g., radiography and fusion research) and can be used in research on nuclear weapons effects.

Depending on the applications intended, there are various functions which must be performed by each component of any given PB weapon system, and each of these functions represents technology which is pushing the current state-of-the-art. Typically, these functions (components or problem areas) include: (1) primary power systems; (2) short-term energy storage; (3) accelerator injectors (or sources of particles); (4) pulse forming networks; (5) pulse power switches; (6) materials (primarily insulators and magnetic materials); (7) accelerator beam dynamics internal to the accelerator structure (including accelerating systems, such as induction and radio frequency accelerator systems); (8) beam conditioning and aiming; (9) propagating beam dynamics external to the accelerator structure; (10) beam-target interaction; and (11) propagating-beam sensing. For several of these areas -- particularly external propagation, beam conditioning and beam dynamics -- there are critical questions regarding scientific feasibility.

In FY 1978, the DOD sponsored a study to review particle beam technology and to develop a program to determine its technical feasibility for possible military applications. The study group recommended several options for resolving the uncertainties associated with the relevant technology areas discussed above. Some of the recommendations have been accepted [deleted].

The possible applications for PB weapons include: [deleted]. The following paragraphs (Section M) discuss the more significant research efforts underway to accomplish those missions.

M. Program Element #62707E - Particle Beam Technology.

1. Capabilities. The principal effort in cost terms in PB weapon research is the DARPA funded program, which is designed to demonstrate [deleted]

[deleted].

Another particle beam effort under this program was transferred from Army to DARPA sponsorship for FY 1981 and following years. [Deleted].

2. Program Status. For FY 1983, the major technical effort would be [deleted].

Another important effort under this program is called "pulsed power technology." This technology is critical for charged PB weapons and may be critical for certain laser weapon devices. Pulsed power technology involves a source of electrical energy, a storage mechanism, a means for switching the energy to a load, and some means of shaping and conditioning the pulse. [Deleted].

Feasibility experiments [deleted]

[deleted].

III. STATED MILITARY REQUIREMENTS

Directed energy weapons could provide US military forces with improved means [deleted].

The Soviets are clearly interested in areas of advanced technology which hold promise of capabilities beyond those possessed by currently deployed [deleted] systems. [Deleted].

[Deleted]

[deleted].

[Deleted].

The US scientific community believes that the stringent requirements of PB weapons render the developmental problems particularly acute. For example, US uncertainties in the understanding of [deleted].

[Deleted]

[deleted].

IV. FUNDING ("then year" $ in millions)*

	FY 81 & Prior	FY 82	FY 83 (est)	FY 84 (est)	FY 85 to Completion	Total Dev.
Advanced Radiation Technology (#63605F)	613.3	75.5	95.1	[deleted]	[deleted]	NA
Advanced Weapons: Laser Applications (#62601F)	98.4	12.8	13.8	[deleted]	[deleted]	NA
[Deleted] Project 2135 (#64406F)	3.6	20.5	0.7	[deleted]	[deleted	NA
Space Laser Program (#63603F)	0	0	40.6	[deleted]	[deleted]	NA
High Energy Laser Technology (#62735N)	357.8**	57.5	63.2	[deleted]	[deleted]	NA
Directed Energy Technology (#62768N)	NA	6.0	14.9	[deleted]	[deleted]	NA
Laser Weapon Technology (#62307A)	20.8	22.9	31.3	[deleted]	[deleted]	NA
High Energy Laser Components (#63314A)	189.3	0	33.1	[deleted]	[deleted]	NA
Strategic Technology/Project ST-3, HEL Technology (#62301E)	303.5	38.6	39.4	[deleted]	[deleted]	NA
Experimental Evaluation of Major Innovative Technologies: EE-7, EE-8 & EE-12 (#62711E)	92.5	61.5	71.0	[deleted]	[deleted]	NA
Particle Beam Technology (#62707E)	68.7***	32.5	31.0	[deleted]	[deleted]	NA

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* Development dollars only. [Deleted].

** Previously funded under P.E. #63754N and P.E. #63587N.

*** Previously funded under P.E. #61101E.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements that are genuinely stabilizing, equitable, and verifiable. DOD's research related to possible DE weapons is consistent with this approach. For example, one research focus is to demonstrate the technological feasibility of a [deleted]. Improved capabilities in this role could enhance deterrence and add stability to the perceived balance of tactical forces.

Research is also conducted to stay abreast of technologies having military potential and to gain insight into what the Soviets and others may be discovering through their own research. This activity also helps provide confidence that the US can maintain an adequate balance of forces.

DE weapons could have [deleted] these programs are reviewed for their consistency with, and potential impact on, the US policy of strategic arms control. The impact of these weapons on strategic stability is discussed below.

B. Relation to Arms Control Agreements.

[Deleted] the current DE research programs are not constrained by existing arms control agreements. The BMD potential of future DE weapons could eventually create a conflict with the obligations assumed by the US under the provisions of the ABM Treaty.

The ABM Treaty bans the development,* testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. In addition, although the Treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams) and including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the Treaty prohibits the deployment of such fixed, land-based systems and components unless the Parties consult and amend the Treaty.

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* The US interpretation of the term "development," as used in the ABM Treaty, is as follows:

> "The obligation not to develop such systems, devices or warheads would be applicable only to that stage of development which follows laboratory development and testing. The prohibitions on development contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or bread-board model." (As provided by Ambassador Gerard Smith to the Senate Armed Services Committee during its hearings concerning ratification of the ABM Treaty. For more complete discussion see Senate Armed Services Committee, Hearing on the Military Implications of the Treaty on the Limitations of Anti-Ballistic Missile Systems and the Interim Agreement on Limitation of Strategic Offensive Arms, 92nd Congress, 2nd Session, July 18, 1972, p. 377.)

The ABM Treaty prohibition [deleted] applies to directed energy technology (or any other technology) used for this purpose. Thus, when such DE programs enter the field testing phase they become constrained by these ABM Treaty obligations.

With regard to DE systems in an ASAT role, only the actual use of systems to interfere with national technical means (NTM)* used to verify compliance with strategic arms control agreements -- as opposed to development, testing, or deployment of systems that could be used in such roles -- is prohibited under the provisions of the ABM Treaty (Article XII) and the SALT I Interim Agreement (Article V) and Article XV of the unratified SALT II Agreement. (Pending the completion of the internal review of US SALT policy, the US has announced that it will not undertake any action that would undermine existing agreements, as long as the USSR continues to do likewise.)

Existing treaties and agreements impose certain additional restraints on ASAT activities. For example, Article IX of the Outer Space Treaty requires international consultations prior to any planned activity or experiment, if the sponsor of such activity or experiment has reason to believe it would cause potentially harmful interference witht the peaceful space activities of others. Also, Article III of the Outer Space Treaty constrains the use of outer space to activities which are "in the interest of maintaining international peace and security and promoting international co-operation and understanding." Other international agreements extend specific protections to certain classes of satellites. Under the Direct Communications Link Improvement Agreement, the US and the USSR each "comfirms its intention to take all possible measures to assure the continuous and reliable operation" of the emergency satellite system; and, under the International Telecommunication Convention, both are obligated to avoid "harmful interference to the radio services or communications" of other parties.

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* NTMs are not defined in any international agreement.

None of these agreements would affect the development of [deleted] systems as long as the testing of such systems did not result in prohibited interference [deleted].

C. Effect on Current and Prospective Negotiations.

Current DOD directed energy programs are consistent with present US positions in arms control negotiations.

The Soviets and the US have, in the past, addressed possible limits on anti-satellite systems, [deleted]. Currently the US is reviewing its policy in this area. [Deleted].

Considering the lack of significant near-term development of US or foreign PB weapons for ASAT (or other military missions), it is unlikely that PB weapon questions -- as distinct from HEL weapon questions -- would impact on current and prospective negotiations in the near-term.

The Soviets, in public and in the Committee on Disarmament Working Group on Radiological Weapons and New Mass Destruction Weapons (MDW), have raised the issue of particle beams produced by accelerators as possibly leading to MDW. They have drafted a proposal on MDW which would, inter alia, ban development and manufacture of weapons using "charged and neutral particles to affect biological targets." [Deleted]. Instead, the US has participated, with the Committee on Disarmament, in a continuing review of the potential for development of such weapons. The objective is to frame specific preventive measures when and if necessary. In any case, most PB weapons, as currently conceived, would not be classified as MDW since they are by nature point weapons. [Deleted].

D. Effect on Global and Regional Stability.

[Deleted] no effect, destabilizing or stabilizing, on a global or regional scale is anticipated in the foreseeable future. [Deleted]

[deleted] the near-term impact of this action on other nations would be expected to be slight, with little or no effect on stability.

New technologies like HEL weapons could serve arms control interests by encouraging nations to negotiate with one another in an attempt to avoid waging and possibly losing an expensive weapons race. It is not possible at this time to make a reasonable assessment of the net impact of the HEL program on future global or regional stability. [Deleted].

E. Technological Implications.

There is little doubt that directed energy weapon development is an area of military technology with high priority and potentially great importance to both the US and USSR. In addition, as prototype HEL weapon systems become visible, other technologically advanced countries may be attracted to this new area of arms technology, though the cost could be a serious restraint. Interest may increase and diffusion of knowledge is likely to take place [deleted].

If laser weapons do begin to make a difference in military calculations, then their deployment will inspire adversaries to develop countermeasures and/or to increase the numbers of offensive weapons in order to cope with the improved defensive capability of laser systems.

The US PB R&D program is not apt to have significant near-term technological impact since its scale is relatively small compared to HEL technology and to related non-weapon technology. Active pursuit of the basic non-military technology is useful in preventing technological surprise.

F. Potential Interaction with Other Programs.

As described earlier, the successful development of DE weapons offers [deleted]. Deployment of a [deleted] system based on directed energy technology would have significant effect on many defense programs.* For example, [deleted].

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* [Deleted].

[Deleted].

G. Verification.

The status of research and development in the technologies associated with DE weapons has two basic intelligence aspects. [Deleted]

[Deleted]

[deleted].

In the past, our ability to assess the [deleted].

[Deleted]

[deleted].

[Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The high energy laser and particle beam concepts represent new technologies with potential weapon applications. [Deleted].

[Deleted]

[deleted].

[Deleted].

The ABM potential of DE weapons has arms control implications because the 1972 ABM Treaty bans the development, testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. In addition, although the Treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams), including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the Treaty prohibits the deployment of such fixed, land-based systems and components unless the Parties consult and amend the Treaty.

The potential of ABM and ASAT applications, as discussed above, provides the only apparent arms control impacts which are associated with the development of DE weapon technologies.

Possible limits on anti-satellite systems have been addressed by the US and the Soviets. The US position on ASAT negotiations is being reviewed.

[Deleted].

[Deleted] though the DE-related R&D efforts funded in this FY

1983 budget have no more than marginal arms control effects now, this technology deserves continuing attention in the future.

PART II: ABBREVIATED ARMS CONTROL IMPACT STATEMENT

DEPARTMENT OF DEFENSE PROGRAMS

SECTION I - Previously Submitted ACIS.

The following Arms Control Impact Statements, which have continuing arms control implications, have had no significant changes in funding, program direction, policy, or international developments that would revise the Administration's analysis forwarded early in 1981. The need for updated ACIS will be reevaluated as these programs evolve.

Anti-Ship Missile Systems

PE 63530N	Over-The-Horizon Targeting
Procurement	AGM/RGM/UGM-84A HARPOON

Large Area Ocean Surveillance Systems

PE 24311N	Undersea Surveillance Systems
PE 24313N	Surveillance Towed Array Sensor
PE 62711N	Undersea Target Surveillance
PE 64789N	Surveillance Towed Array Sensor
PE 62702E	Tactical Technology (Ocean Monitoring and Control)
Procurement	T-AGOS
Procurement	SURTASS
Procurement	SOSUS
Procurement	T-ARC

Strategic Warning and Attack Assessment

PE 12431F	Defense Support Program and Associated Procurement
PE 12423F	Ballistic Missile Early Warning System and BMEWS (474L) Modification Procurement
PE 31357F	Integrated Operations Nudets Detection System (IONDS)
PE 12417F & PE 63703F	CONUS-Over-the-Horizon Radar System
PE 63424F	Missile Surveillance Technology
PE 63425F	Advanced Warning System
PE 12325F	Joint Surveillance System
PE 12411F	Surveillance Radar Stations/Sites

Advanced Isotope Separation and Centrifuge Enrichment

(1 program)

NAVSTAR Global Positioning System

PE 64778F	NAVSTAR GPS (Air Force)
PE 64778N	NAVSTAR GPS (Navy)
PE 64778A	NAVSTAR GPS (Army)
PE 63401N	NAVSAT Timing & Ranging (NAVSTAR GPS) (Navy)

SECTION II - Other Programs Which Meet Congressional Criteria for Arms Control Impact Statements.

The activities within the programs listed below are primarily associated with one or more of the following:

-- Programs in too early an exploratory research and development stage to determine with precision their possible arms control implications.

-- Programs providing continuing normal support for existing missions or deployed operational systems and organizations.

-- Production and procurement of a developed weapon system; non-nuclear munitions, cartridges, projectiles, rockets, etc., and associated equipment; spares and repair parts; associated electronic, communications, training and support equipment; support, storage, industrial and test facilities construction and operations; utility and specialized vehicles, ships, tanks, and aircraft; miscellaneous production charges, first destination charges and outfitting costs. In themselves, none of the activities in this category is judged to have a significant impact on arms control policy or negotiations.

-- Modification or modernization of an already procured system which does not significantly alter the characteristics of the system from an arms control standpoint.

-- Programs which were analyzed as in-depth statements in previous years and found to have little, if any, additional arms control impact.

-- Programs involving miscellaneous research, development, testing, and evaluation of programs not otherwise categorized, which are judged to have marginal, if any, impact on arms control policy or negotiations.

ARMY (RDT&E)

Defense Research Sciences PE 61102A (A1, Line 2)
RDT&E funds to support basic and applied research in the physical, engineering, environmental, biological-medical, and behavioral-social sciences directly related to explicitly stated long-term national security needs and to the solution of identified military problems. This program forms the basis for subsequent exploratory and advanced development programs.

Nuclear Weapons Effects/Fluidics PE 62120A (A1, Line 5)
RDT&E funds to ensure that Army tactical equipment is survivable in a nuclear environment. Technology will be developed to ensure that hardness is maintained during production and fielding of systems.

Large Caliber and Nuclear Technology PE 62603A (A1, Line 13)

Includes all exploratory investigations and demonstrations associated with non-nuclear projectile weapons systems of calibers larger than 50 millimeters. Embraces efforts in interior, exterior, and terminal ballistics to include supporting technologies of fuzing, terminal guidance, and energetic materials for all caliber applications. Also includes munitions technology which emphasizes technology development to significantly improve safety and survivability of Army components of nuclear warhead sections.

Infantry Manportable Anti-Armor Weapon System PE 63612A (A5, Line 100)

Continues the program of competitive flight demonstrations of critical hardware components for two moderate risk anti-armor system concepts.

Mobile Protected Gun PE 63635A (A6, Line 108)

To provide the light forces (Army & Marine) with a light-weight, strategically deployable, tactically mobile, anti-armor combat vehicle. Vehicle will be used with the Joint Rapid Deployment Force (JRDF).

Advanced Attack Helicopter PE 64207A (A7, Line 130)

Includes RDT&E funds to develop an advanced, all-weather, attack helicopter capable of defeating tanks, providing quickly responsive aerial fires as an integral element of the ground forces.

PATRIOT (SAM-D) PE 64307A (A7, Line 140)

Includes RDT&E funds for a surface-to-air missile system to replace improved HAWK and NIKE HERCULES. Efforts include continued development and testing of a counter-antiradiation missile and enhanced capabilities in the area of reduced radar cross-section and high velocity targets.

Heliborne Missile - HELLFIRE PE 64310A (A7, Line 143)

Includes the engineering development of a laser-directed heliborne missile system required by the Army as an advanced anti-armor system. Other advanced terminal homing seekers will be developed.

GRASS BLADE PE 64313A (A7, Line 145)

Special access program.

Multiple Launch Rocket System (formerly GSRS) PE 64314A (A7, Line 146)

RDT&E funds to complete development of the self-propelled fast-reacting multiple rocket launcher which will provide a high volume of fire in a very short time against the surge threat.

Division Air Defense Gun - DIVAD PE 64318A (A7, Line 148)

Includes RDT&E funds to fabricate pre-production prototypes of a modern air defense gun. The system, when fielded, will replace the VULCAN air defense gun system, thereby significantly improving the all-weather capability of air defense in the forward combat areas.

Tank Systems PE 64620A (A8, Line 162)

Includes RDT&E funds to continue development of the Army's M1 tank. With improved fire control and shoot-on-the-move capabilities, the M1 tank will provide a significant improvement to the Army's offensive ground combat capability with its significantly improved ballistic protection, cross-country agility, and firepower. The M1 will replace M60 series tanks in selected Active Army units.

COPPERHEAD PE 64621A (A8, Line 163)

A cannon-launched guided projectile (CLGP) designed to home on a generated energy source and give a high probability of first round kill.

Tank Gun Cooperative Development PE 64630A (A8, Line 168)

Includes RDT&E funds for development and integration of a 120mm gun into the M1 tank. The program also provides for development of a family of 120mm ammunition to meet user requirements and for modification, redesign, and development of those components of the M1 necessary to accommodate the 120mm gun system.

Joint Tactical Communication Program (TRI-TAC) PE 28010A (A10, Line 209)

Provides new common use, tactical communications systems to replace existent manpower intensive, non-secure, antiquated systems.

SATCOM Ground Environment PE 33142A (A10, Line 210)

Satellite communications terminals for Army tactical ground forces and the Joint Defense Satellite Communication System.

Kwajalein Missile Range PE 65301A (A11, Line 233)

Includes manpower authorizations, peculiar and support equipment, necessary facilities and the associated costs specifically identified and measurable to RDT&E and military construction funds. Kwajalein Missile Range (a national range) has the mission of providing support for strategic offensive and defensive missile and related developmental test programs.

Program-Wide Activities PE 65801A (A11, Line 240)

Includes funding for civilian and military manpower and other costs incurred for the operation and maintenance of RDT&E-operated Army headquarters and installations (other than major range and test facility bases) and for logistical and other service support to R&D commands designated as Army Management Headquarters Activities. Also includes support of other administrative activities (e.g., standardization groups and liaision officers) not identifiable with specific research and development projects financed under other program elements. Includes procurement of laboratory special purpose equipment and ADP equipment in support of R&D activities.

DARCOM Major Range and Text Facilities PE 65804A (A12, Line 243)

Includes civilian and military manpower authorizations for necessary facilities, supplies and associated costs at five major DOD development test activities under the US Army Materiel Development and Readiness Command (DARCOM).

ARMY (Procurement)

AH-64 Attack Helicopter (A2, Line 4)

Procurement of AH-64 advanced attack helicopters, the twin engine anti-tank weapon system armed with the HELLFIRE laser-guided missile, capable of destroying armored vehicles under day/night and adverse conditions.

UH-60A BLACK HAWK (A2, Line 6)

Procurement of UH-60A BLACK HAWK helicopters, the twin engine squad carrying helicopter. UH-60A will enhance tactical mobility with increased speed, lift-capacity, range, maintainability and survivability.

EH-60A (Quick Fix) (A2, Line 8)

Procurement of EH-60A Quick Fix Electronic Helicopters. The EH-60A utilizes the BLACK HAWK airframe for electronic warfare and is designed to identify, locate, listen and disrupt enemy C^3.

AH-1S Attack Helicopter (COBRA/TOW) Modifications (A3, Line 14)

Provides funds for five product improvement programs on the COBRA/TOW. These are: improved attitude-heading reference system, radar jammer, wire strike protection system, laser warning receiver, and nap-of-the earth communications.

CH-47C Cargo Helicopter (CHINOOK) (A3, Line 15)

Provides funds for continuation of the CH-47D modernization program, the currently deployed tandem-rotor helicopter which provides air mobility for artillery weapons, ammunition, bulk fuels, troops, general cargo, medical evacuation, and recovery of downed aircraft.

Spare and Repair Parts (Aircraft) (A3, Line 22)

Continuing procurement of initial spares and repair parts, replenishment spares and repair parts, and avionics spare parts for Army aircraft.

Common Ground Equipment (A3, Line 25)

Procurement of tools, shop sets, aviation ground support equipment, airfield support equipment, flight simulators and other individual items.

CHAPARRAL (MIM-72-A/C) (A6, Line 1)

Continues procurement of CHAPARRAL replacement motors and the modifications of the CHAPARRAL missile system to increase system operability/reliability.

US ROLAND (A6, Line 3)

Continued production support of US ROLAND missile systems funded in previous years. ROLAND is an all-weather, highly mobile, air-transportable, short-range air defense system providing vital-area defense against high performance, low-flying aircraft.

PATRIOT (SAM-D) (A6, Line 4)

Continues procurement of the PATRIOT air defense system, an advanced surface-to-air missile system with a high single shot kill probability, and a capability for operation in an ECM environment. Its mission is to provide area air defense of the division, corps and high-value assets in the rear area. PATRIOT will replace the HAWK and NIKE HERCULES.

STINGER (A6, Line 5)

Continues procurement of the STINGER man-portable, infrared homing air defense weapon which is replacing the REDEYE.

Laser HELLFIRE System (A6, Line 6)

Provides funds for the continued procurement of the HELLFIRE missile which has been developed as the primary anti-tank weapon for the AH-64 Attack Helicopter.

TOW (BGM-71A) (BTM-71A) (A6, Line 8)

Provides for the continued procurement of a heavy anti-tank missile system for maneuver battalions and the AH-1 COBRA/TOW helicopter.

Multiple Launch Rocket System (MLRS) (A6, Line 10)

Continued procurement of MLRS rockets and associated ground support equipment. MLRS is a self-propelled multiple rocket launcher system designed to counter enemy field artillery air defense systems and supplement cannon artillery.

HAWK (Modifications) (A6, Line 12)

Continued procurement of HAWK replacement motors and for modifications of the system to improve operability/reliability.

TOW (Modifications) (A6, Line 13)

Continued procurement and improvement of the currently deployed Army improved TOW.

GRASS BLADE (A7, Line 19)

A controlled access program.

Spares & Repair Parts (Missiles) (A7, Line 21)

Continuing procurement of initial spares and repair parts, replenishment spares and missiles for Army missile systems.

Production Base Support (Missiles) (A7, Line 24)

Continued procurement of equipment used for production testing and depot maintenance support. Development of manufacturing methods and technology projects that deal with the advancement of manufacturing techniques.

Fighting Vehicle System (A9, Line 3)

Procurement of infantry and cavalry fighting vehicles. Systems are full-tracked, armored vehicles which provide mechanized infantry and cavalry units with protected cross-country mobility and vehicular mounted firepower. Vehicles are designed to be compatible with the new M1 main battle tank.

Tank, Combat, FT, 105mm Gun, M1 Series (A9, Line 9)

Procurement of M1 main battle tanks. The M1 will initially mount a 105mm main gun and three complementary armament systems with improved fire control and shoot-on-the move capabilities. It will have improved ballistic protection, higher cross country speeds and faster acceleration. In FY 1985 it will incorporate a 120 MM gun.

FIST Vehicle Modification (A9, Line 14)

Provides funds for the procurement of kits required to convert M113 armored personnel carriers to fire support team vehicles. FIST vehicles will provide protection for the Ground Laser Locator Designator.

Spares and Repair Parts (Weapons and Tactical Combat Vehicles) (A10, Line 20)

Initial procurement and replenishment of spares and repair parts related to tracked combat vehicles.

Production Base Support (TCV-WTCV) (A10, Line 22)

Includes depot maintenance and plant equipment requirements. Major areas of emphasis are: (a) M1 production support; (b) 120mm gun integration; (c) rehabilitation of the Stratford Army Engine Plant and modernization of fire control production facilities.

DIVAD Gun (A10, Line 24)

Continues procurement of an all-weather Air Defense System consisting of twin 40mm cannons, search and track radars mounted on an M48A5 tank chassis. Will provide air defense protection to forward maneuver elements of the field Army.

Production Base Support (WOCV-WTCV) (A11, Line 39)

Continues the modernization of the cannon production base at Watervliet Arsenal and modernization efforts at Rock Island Arsenal.

Nuclear Weapons Support Material (A13, Line 1)

Provides for continuing procurement of nuclear weapon support material for deployed operational systems.

Conventional Ammunition Procurement (A13-15, Lines 5-54)

Provides for procurement of conventional ammunition of various types and categories for the US Army. Includes: cartridges, fuzes, projectiles, primers, small missiles and rockets, and mines.

Provision of Industrial Facilities (Ammunition) (A16, Line 65)

Provides for establishment, rehabilitation, modernization, and expansion of government owned facilities to support production of ammunition.

Truck, 5T, 6 X 6, All Body Types (A18, Line 16)

Procurement of 5-ton wheeled tactical vehicles. Vehicle is produced in 7 body styles: cargo, dump, tractor, van, wrecker, stake and bolster.

Truck, 10T, 8 X 8, All Body Types (A18, Line 17)

Provides funds for procurement of 10-ton wheeled tactical transport vehicles. Truck is required to transport ammunition, petroleum, and missile systems, and can be used for recovery of other heavy wheeled support vehicles and combat systems. Major systems supported include MLRS, PERSHING II and PATRIOT.

Spare and Repair Parts (Tactical Vehicles) (A19, Line 23)

Provides for the continuing procurement of spares and repair parts for Army tactical vehicles.

Speech Secure Equipment TSEC/KY-57 (A24, Line 120)

Procurement of tactical secure voice equipment designed for manpack and vehicular application. Provides secure transmissions for tactical systems such as TACFIRE and FIREFINDER.

Tactical Mgt Info System (TACMIS) (A25, Line 144)

Consists of mobile or transportable militarized or commercially available general purpose computer equipment utilized to automate standard personnel and logistics functions in combat service support units from the brigade to the theater rear.

Tactical Jamming System (TACJAM) AN/MLQ-34 (A25, Line 151)

Continued procurement of the ground based tactical jamming system to be targeted against hostile communication emitters.

Ground Laser Locator Designator (GLLD) (A26, Line 160)

Laser designator used by military fire support teams to range/designate targets for attack with laser guided munitions (COPPERHEAD, HELLFIRE).

Radar Set, Mortar Locating, AN/TPQ-36 (A26, Line 170)

Continued procurement of a counter mortar radar that will detect hostile mortars, artillery and rockets at short and mid-ranges.

Radar Set, Artillery Locating AN/TPQ-37 (A26, Line 171)

Continued procurement of a counterbattery radar that will automatically locate hostile artillery and long-range rocket launch sites.

Spares and Repair Parts (Electronics) (A27, Lines 178-180)

Provides funds for the procurement of initial and replenishment spares and repair parts to support Army electronic systems.

Medical Support Equipment (A31, Line 259)

Procurement of equipment required to support health care programs in fixed TDA/MTDA medical facilities/activities world-wide. Includes initial and replacement equipment for Army health care facilities.

NAVY (RDT&E)

Defense Research Sciences PE 61153N (N1, Line 2)

A continuing program, the purpose of which is to conduct research in the physical, engineering, environmental and life sciences in order to obtain information and understanding which can lead to discoveries of potential importance to the Navy, the solution of Navy technical problems, and the improvement of Navy operations.

SSBN Security Technology Programs PE 11224N (N4, Line 68)

Provides for a technological assessment of the potential capability of the Soviet Union to threaten covert mobility of the Fleet Ballistic Missile Submarine Force and development of counter-measures technology.

Nuclear Propulsion Technology PE 62542N (N1, Line 6)

A comprehensive exploratory development program directed toward the development and application of advanced technologies for potential utilization in Navy nuclear propulsion plants.

Ships/Subs/Boats Technology PE 62543N (N1, Line 7)

Program develops the basic technology necessary to achieve significant advances in the performance of naval ships, submarines and boats, and in reducing their acquisition and support costs.

Environmental Applications PE 63207N (N2, Line 27)

Related projects which provide environmental support for global naval operations; i.e., assessment and exploitation of environmental effects on weapon systems, emerging environmental data collection technology, and remote sensing of the ocean/atmosphere environment.

Submarine ASW Stand-off Weapon PE 63367N (N5, Line 96)

Program to continue the demonstration and validation phase of the ASW stand-off weapons program. System is designed to provide a counter to the projected Soviet submarine threat.

Submarine Sonar Developments PE 63504N (N5, Line 104)

Provides for the advanced development and testing of improvements to present and future integrated sonar systems to maintain acoustic superiority over 1985-2020 high performance submarines and surface ship threat.

PILOT FISH PE 63525N (N6, Line 117)

Limited access program.

RETRACT SILVER PE 63537N (N6, Line 125)

Limited access program.

Submarines PE 63561N (N6, Line 129)

Advanced submarine development programs which include: atmosphere control systems; propulsion safety; efforts to extend operational depths of future submarines; damage control equipment; shock hardening and submarine propellers.

Submarine Tactical Warfare Systems PE 63562N (N6, Line 130)

Program provides for the development of submarine tactical warfare systems which include: torpedos; acoustic and torpedo counter-measures; the reduction of own-submarine target strength systems; tactical situations display and incorporation of communication data links for attack submarine command and control.

Special Test Systems PE 63575N (N7, Line 138)
A continuing controlled access program.

Advanced ASW Torpedo PE 63610N (N7, Line 145)
This program is designed to develop a new torpedo capable of countering predicted improvements in Soviet submarine performance characteristics. It will replace the current lightweight MK-46 torpedo.

Tactical Nuclear Weapons Development PE 63634N (N7, Line 147)
Includes RDT&E funds to support joint DOE/Navy Phase 1 conceptual and Phase 2 technical feasibility advanced development efforts leading to the modernization of Navy and Marine Corps tactical nuclear weapons.

Special Processes PE 63787N (N8, Line 163)
A continuing controlled access program.

Light Airborne Multi-Purpose System MK III PE 64212N (N8, Line 170)
Includes RDT&E funding to provide for development of a computer integrated ship/helicopter system optimized for anti-submarine warfare. System has a secondary mission of antiship surveillance and targeting.

AV-8B Aircraft PE 64214N (N8, Line 172)
Provides funds for continued RDT&E of light attack aircraft designed

to operate from austere forward sites in direct support of ground forces. Aircraft will meet Marine Corps requirements as follow-on improvement to the HARRIER.

Navy Air Combat Fighter, F/A-18 Naval Strike Fighter PE 64263N (N9, Line 188)

Provides funds for developing the F-18 Naval Strike Fighter. A twin engine, multi-mission tactical aircraft to be employed in both Navy and Marine Corps fighter and attack squadrons, the F-18 will replace the aging F-4 and A-7 aircraft, and complement the F-14 aircraft.

Aircraft Engine Component Improvement Program PE 64268N (N9, Line 192)

This program provides the engineering support required to obtain changes which are essential for satisfactory system performance throughout the operational life of the system.

High-Speed Anti-Radiation Missile PE 64360N (N9, Line 201)

A joint Navy/Air Force program to develop a lethal defense suppression weapon system capable of destroying elements of an enemy air defense radar network. FY 1983 program provides funds to complete RDT&E and to initiate full-scale production of Navy & Air Force missiles.

Submarine Combat Systems Development PE 64524N (N10, Line 219)

Provides for competitive engineering development of a new generation combat suite for attack submarines; intended to provide the ships with clear tactical superiority in engagements with improved threat platforms.

Submarine Tactical Warfare Systems PE 64562N (N10, Line 223)
Program accomplishes design, engineering development, and test and evaluation of submarine tactical warfare systems & weapons.

Ship Development PE 64567N (N10, Line 225)
Program element includes contract design phase for non-strategic ships, and the engineering development phase of selected systems/ submarine systems for these ships.

Tactical Information Systems PE 25604N (N12, Line 270)
Provides funds for the Joint Tactical Information Distribution Systems and integrated communication navigation and indentification system which will provide secure, jam-resistant communication in aircraft applications.

Special Activities Support PE 34111N (N14, line 306)
A continuing limited access program.

Aerial Target System Development PE 64258N (N15, Line 310)
This program provides for engineering development of target systems and associated electronic and infrared sub-systems necessary to duplicate or simulate threat characteristics, radar cross sections, infrared signature, radio frequency emissions, and control systems.

LANT Undersea Test/Evaluation Center PE 65852N (N15, Line 319)
This program provides, on a continuing basis, the operational maintenance support for the Navy's only secure and fully instrumented anti-submarine warfare test and evaluation range.

RDT&E Laboratory/Facility Management Support PE 65861N (N15, Line 324)
A continuing program which provides for certain program-wide management and operations costs at specified R&D laboratories and other facilities.

RDT&E Instrumentation/Material Support PE 65862 (N15, Line 325)
A continuing program which funds all investment costs and certain support costs at Navy RDT&E labs and other facilities.

RDT&E Ship/Aircraft Support PE 65863N (N15, Line 326)
Includes RDT&E funds to provide for operation and maintenance of ships and aircraft assigned for support of weapon system RDT&E projects. Also funds aircraft conversions to target drones in support of weapon system testing.

Test/Evaluation Support PE 65864N (N15, Line 327)
The annual institutional funding for the operation, maintenance and test instrumentation and separate improvement at four of the six Navy DOD major range and test facility base activities. These facilities include Pacific Missile Range, Naval Air Test Center, Naval Air Propulsion Test Center and Naval Weapons Center Ranges.

In addition, investment costs at Lakehurst Naval Air Station are funded within this program element.

NAVY (PROCUREMENT)

EA-6B PROWLER (N2, Lines 3 & 4)

Continued procurement of the four place, twin-engine, advanced electronic warfare aircraft which provides protection to Navy strike aircraft through a computer controlled electronic surveillance control system and high power jamming transmitters.

F-14A (TOMCAT) (N2, Lines 7 & 8)

Continued procurement of carrier based air superiority/fleet air defense fighters capable of air-to-air combat and air-to-surface attack missions. System has visual attack and all-weather capability.

F-18 (HORNET) (N2, Lines 9 & 10)

Continued procurement of single seat, carrier based, high performance, multi-mission, fighter aircraft. Missions include fleet air defense, air superiority, air-to-ground interdiction.

CH-53E SUPER STALLION (N23, Lines 11 & 12)

Continued procurement of the three engine, shipboard compatible, Navy and Marine Corps heavy lift helicopter. Designed for heavy cargo/troop/transport in Marine Corps missions. Navy missions include vertical on-board delivery for fleet replenishment.

SH-60B (LAMPS MK III) (N3, Lines 13 & 14)

Continued procurement of the small sea-based helicopter configured to operate from destroyer type ships. The SH-60B is optimized for anti-submarine warfare with a secondary mission of anti-ship surveillance and targeting.

P-3C ORION (N3, Lines 15 & 16)

Land-based, multi-engine, turbo prop, maritime patrol aircraft with primary missions of ASW warfare. Secondary missions are maritime reconnaissance, aerial mining, shipping destruction and intelligence collection. Programmed force level is the procurement of 24 squadions by FY 1986.

E-2C HAWKEYE (N3, Lines 17 & 18)

Continued procurement of the carrier-based, twin-engine, turboprop airborne early warning aircraft designed for airborne early warning and command and control under all weather conditions.

SH-2F (ASW Helo) SEA SPRITE (N3, Line 19)

Continued procurement of twin-engine helicopter designed as the air sub-system of the LAMPS MK1 weapon system. System is deployed aboard FF1040 and FF1052 class frigates in the primary role of anti-submarine warfare.

VCX (N4, Line 22)

Advanced procurement for VCX aircraft to be procured in FY 1984. VCS is a carrier-capable delivery aircraft used to fulfill the airlift support requirements of the fleet.

EC-130Q (TACAMO) HERCULES (N4, Line 26)

Continued procurement of the basic C-130 aircraft, modified for airborne communications. In this configuration the EC-130Q is provided with increased engine performance, and special communications, navigation and flight instrument systems.

A-4 Series Modifications (N4, Line 28)

Program represents a series of A-4 aircraft modifications, paramount among which is the replacement of the current ejection seat with a state-of-the-art model currently being procured for the A-7. Also included are modifications to provide needed additional combat mission counter-measures warning and direction finding capability.

A-6 Modifications (N4, Line 29)

Hydraulic, electrical and avionics modifications to the A-6 all-weather attack aircraft that extends the service life and updates the capabilities of the aircraft.

EA-6 Series Modifications (N4, Line 30)

A series of modification programs to update carrier-based electronic warfare aircraft. Modifications are designed inter alia to improve reliability and maintainability, enhance survivability, lessen life cycle costs and improve readiness.

A-7 Modifications (N4, Line 31)

Primarily avionic modifications to the carrier-based, attack A-7 aircraft. Will provide a passive night vision capability to enhance weapons delivery accuracy during night operations, improve navigation, provide counter-measures warning, and improve operational readiness, and minimize life cycle costs.

F-4 Modifications (N4, Line 31)

Provides for the continued modification of the F-4 air superiority fighter aircraft. Major modifications include service life extension work on the basic airframe and improved radio and navigation equipment.

F-14A Modifications (N5, Line 35)

A series of modifications, the most significant of which is the replacement of redesigned engine components to achieve improved durability, reliability, and maintainability changes to the aircraft.

H-46 Modifications (N5, Line 40)

Major modifications include service life extension work on the basic airframe, rotorblade improvements and navigation equipment modernization for the Navy's general purpose logistics and troop carrying helicopter.

H-3 Series Modifications (N5, Line 44)

Major modifications include service life extension work on the basic airframe and main gearbox of this aircraft model.

P-3 Series Modifications (N5, Line 47)

A series of modifications, the most significant of which are associated with the HARPOON missile and the infrared detecting system.

S-3 Modifications (N5, Line 48)

Modifications of the S-3 series aircraft initiated to correct deficiencies that adversely impact on aircraft mission, capability and safety and to reduce maintenance actions and operational problems.

E-2 Series Modifications (N5, Line 49)

Modification incorporates an advanced radar processing system that allows fully automatic overland detection and improved electronic counter counter-measures.

Common ECM Equipment (N6, Line 62)

Provides funds for development and procurement of radar warning receiver system and related systems and EW systems improvements.

Spares and Repair Parts (Aircraft) (N6, Line 64)

Repairable parts procured in support of operating forces and industrial activities within the naval aviation establishment. Includes all Navy aircraft.

Common Ground Equipment (N6, Line 65)

Common ground equipment includes avionics support, aircraft systems trainers, training aids and devices, and miscellaneous aircraft maintenance and ground support equipment.

Aircraft Industrial Facilities (N6, Line 66)

Provides for calibration equipment for Navy standards and calibration laboratories. Also provides for capital improvements, modernization, and maintenance of government-owned, but contractor-operated, aircraft producing industrial plants.

Other Production Charges (N6, Line 68)

Provides funds for miscellaneous production support and testing services, aircraft cameras, various equipment for US Coast Guard aircraft and ground support equipment and other support costs for out-of-production aircraft.

AIM 7/M SPARROW (N10, Line 10)

Continued procurement of a conventionally-armed, radar-guided (SPARROW-III) missile used in air-to-air and snip-to-air weapon systems now in the inventory.

AIM 9/M SIDEWINDER (N10, Line 26)

Continued procurement of the joint USN/USAF short range, air-to-air, infrared (IR), dogfight missile employed by both fighter and attack aircraft. Provides significant improvement over previous SIDEWINDER versions by increasing the firing envelope through its all-aspect launch capability.

AIM 54A/C PHOENIX (N10, Line 27)

Continued procurement of a conventionally-armed, air-to-air, guided missile carried aboard the F-14 aircraft in order to replenish training ammunition expended and to outfit new squadrons.

AGM-88A HARM Missile (N9, Line 16)

Continued procurement of the high speed, air-to-surface, anti-radiation, HARM missile designed to suppress or destroy land and sea-based radars supporting enemy air defense systems.

Aerial Targets (N9, Line 24)

Procurement of aerial targets to provide realistic presentations of potential threats to support Navy training in the use of missiles and anti-aircraft guns.

Spares and Repair Parts (Missiles) (N10, Line 32)

Spares and repair parts for the repair of missiles or components which fail or are damaged while in the fleet.

Weapons Industrial Facilities (N10, Line 33)

Provides for the production support for missile, torpedo, mine and gun producing industrial facilities at other than in-house facilities.

Classified Projects (N10, Line 35)

Limited access program.

Torpedo MK-48 Modifications (N10, Line 37)

The MK-48 torpedo is an in-service conventional weapon used in both the ASW and anti-ship role. Modifications are aimed at improving reliability, maintainability and reducing life cycle costs.

Torpedo MK-46 NEARTIP (N10, Line 38)

Provides for the continued peocurement of the MK-46 lightweight ASW torpedo launched from surface ship torpedo tubes, ASROC launchers, and fixed and rotary wing aircraft.

MK-60 CAPTOR (N10, Line 39)

Provides for the continued procurement of CAPTOR weapons, and fleet support items. The CAPTOR is a moored, influence-activated, ASW mine which employs a modified MK-46 torpedo as a payload.

Torpedo Support Equipment (N11, Line 47)

Provides the fleet with the components necesary to restore weapons used to conduct training exercises which involve torpedo live firings.

MK-15 PHALANX Close-in Weapons System (N11, Line 49)

Provides for the backfit of the PHALANX fast-reaction, last-ditch, air defense system in active fleet ships.

SSN-688 Class Nuclear Submarine (N15, Line 7)

Provides for the construction of one follow-on SSN-688 class nuclear submarine, the only weapon system capable of operating for long periods of time in waters under enemy air/water and surface control. The SSN-688 submarine will provide the characteristics necessary to counter the new classes of Soviet high speed submarines in addition to providing improved sensor and weapons systems.

FASSN Class Nuclear Submarine (N15, Line 8)

Provides for the procurement of long leadtime nuclear propulsion plant equipment, and the commencement of detailed design of a new class of nuclear submarines.

CV Service Life Extension Program (SLEP) (N15, Line 9)

The aircraft carrier service life extension program (SLEP) will extend the life of FORRESTAL class aircraft carriers from 30 years to 45 years. Includes propulsion, auxiliary equipment and electronics.

CG-47 AEGIS Cruiser (N15, Line 11)

New class of guided missile cruiser, armed with AEGIS and other advanced AAW/ASW/SUW systems to operate with Main Battle Groups and Amphibious Task Groups. The CG will be a broadly capable, heavily-armed and survivable cruiser for the Navy.

FFG Guided Missile Frigate (N16, Line 15)

Continued procurement of FFG-7 class frigates which are designed to provide self-defense and supplement existing escorts in the protection of underway replenishment groups, amphibious forces and mercantile shipping.

Maritime Prepositioning Ship (T-AKX) (N16, Line 17)

Authorization requested for one Maritime Prepositioning Ship; will provide prepositioned combat unit equipment and supplies to support specially organized Marine amphibious brigades.

Service Craft (N17, Line 28)

Authorization is required for four harbor tug boats and one training craft.

Outfitting (N17, Line 31)

Government furnished repair parts and other material, including stock fund items and general use consumables, required to fill ships' initial allowance of storeroom and operating spare items.

Post Delivery (N18, Line 32)

Design, planning, government furnished material and related labor costs required to correct ship deficiencies defined during acceptance and shakedown trials.

Reactor Power Units (N22, Line 43)

Assemblies of nuclear fuel and associated structural and reactivity control equipment required for the periodic refueling of nuclear powered ships.

Reactor Components (N22, Line 44)

Includes the components, equipment and material required to provide minimum support needed for the continued safe and reliable operation of Navy nuclear propulsion plants. Funds are programmed for acquisition of replacement components for ship alterations, replacement of stock spare components, and equipment necessary for refueling nuclear powered ships.

Shipyard Modernization Equipment (N23, Line 54)
Provides the investment required for industrial and other plant equipment necessary to support the Shipyard Modernization Program.

Spares & Repair Parts (N23, Line 58)
Repairable parts procured in support of operating forces and industrial activities within the naval establishment.

AN/BQQ-5 (N24, Line 73)
Towed array sonar for detection of submarines, surface ships, ASW helicopters and torpedoes. Procurement of eight systems for SSN 594/637 backfit.

Sonar Switches and Transducers (N24, Line 78)
Program provides in-service, anti-submarine warfare sonars on surface ships and submarines. Components are required to support units in the fleet on a replacement basis on regularly scheduled ship overhauls and when units are reported defective due to age, obsolescence, or casualty.

AN/SQR-19 (TACTAS) (N25, Line 89)
Towed array tactical sonar program.

AN/WLQ-4(V) (PRAIRIE WAGON) (N26, Line 108)
A classified program.

Naval Tactical Data System (N26, Line 113)

Provides: (a) general purpose combat direction system in major warships permitting rapid integration of ship sensor information; (b) analysis of operational data; and (c) initiation of instantaneous ship or fleet reaction in accordance with fleet doctrine stored in computer memories.

SATCOM Ship Terminals (N28, Line 161)

Program continues the procurement of demand-assigned, multiple access systems which provides up to a five-fold increase in satellite channel capacity. These terminals provide high data rate anti-jam communications via the DS/CS satellite systems.

Spares and Repair Parts (N30, Line 191)

Provides for procurement of electronic parts and assemblies for miscellaneous communications and electronic equipment.

AN SSQ-41 JEZEBEL (N30, Line 193)

A passive, omni-directional sonobuoy used during the search and localization phases of the air ASW mission to detect and classify submarines.

AN/SSQ-53 DIFAR (N30 Line 195)

A passive, directional sonobuoy used during the localization phase of the air-ASW mission; provides accurate target localization information.

AN/SSQ-77 (VLAD) (N30, Line 198)

A passive, directional sonobuoy that provides a 7-10 db improvement over the current AN/SSQ-53A system.

General Purpose Bombs (N31, Line 201)

Provides funds for continuing procurement of general purpose bombs to support Navy mission requirements.

Practice Bombs (N31, Line 208)

Provides funds for continuing procurement of practice bombs and marker signals.

5/54 Ammunition Components (N32, Line 238)

Provides monies for ship gun ammunition (20MM thru 8-inch). Includes ammunition required for fleet training, gun calibration tests, new production trials and reserve ammunition.

Spares & Repair Parts (N35, Line 283)

Provides for the procurement of initial spare parts to support new end items for the replenishment spare parts consumed by the fleet.

Trucks (N35, Line 285)

Provide funds for the replacement and/or initial outfitting of trucks (out of a total inventory of 33,237).

Amphibious & Special Equipment (N35, Line 294)

Provides the Naval Construction Force with the equipment necessary to maintain a readiness to meet contingency requirements. Includes funds for the Maritime Prepositioning Program in support of the Rapid Deployment Force.

Medical Support Equipment (N37, Line 329)

Provides for the acquisition of medical and dental equipment in support of direct health care delivery. Supports 23 regional medical centers, 8 hospitals, 8 regional medical clinics, 6 branch hospitals, 23 regional dental centers, 11 specialized medical units and 5 training facilities which together with their branch facilities comprise 383 individual activities. Funds are required to replace worn-out, obsolete equipment and to provide for the acquisition of new technological developments for a modern health care delivery system.

Projectile, 155MM, ICM (DP) (N40, Line 11)

Provides funding for continued procurement of improved conventional munitions projectile for 155MM howitzer.

LVT7A1 (N41, Line 34)

Continues a four year effort of materiel and vehicle assembly.

LVT7 Service Life Extension Program (SLEP) (N41 Line 35)

Continues procurement of kits for the conversion of LVT7 SLEP vehicles. The LVT7 SLEP is a product improvement program designed to extend the useful life of the present amphibian vehicle (1989 or beyond).

Light Armored Vehicle (N41, Line 36)

Continues the acquisition of the light armored vehicle. Vehicle is fully equipped with weapons, fire control systems, support equipment and supplies. These vehicles will be used to begin formation of a rapidly deployable combat unit.

AIR FORCE (RDT&E)

Defense Research Science PE 61102F (F1, Line 2)

The funding base for a continuing program to obtain scientific knowledge required to provide alternatives for future development, prevent technological surprise, and assist in the solution of technical problems, thereby enhancing Air Force mission area operational capabilities. Program maintains in-house scientific expertise for immediate availability when needed by the Air Force.

Materials PE 62102F (F1, Line 4)

Program supports Air Force exploratory materials developments. It develops new and improved materials which are required to meet the increased performance, reliability and survivability of current and future areospace systems. Includes RDT&E funds for contract and in-house effort of the Air Force Materials Laboratory (AFML) located at Wright-Patterson AFB, Ohio.

Aerospace Flight Dynamics PE 62201F (F1, Line 5)

Provides the flight vehicle technologies required for the design and development of future aircraft, missile and spacecraft, and for the improvement of current vehicles. The program also provides for the contract and in-house effort of the Air Force Flight Dynamics Laboratory (AFFDL) located at Wright-Paterson AFB, Ohio.

Aerospace Biotechnology PE 62202F (F1, Line 6)

Program includes investigation into the protection of man in hazardous operations and man-machine integration technology for system design and operation. The program funds the operational support and management for the RDT&E contract in-house efforts of the following: Aerospace Medical Divison (AMD), Brooks AFB; 6571st Aerospace Medical Research Lab, Wrignt-Patterson AFB; and USAF School of Aviation Medicine, Brooks AFB.

Aerospace Propulsion PE 62203F (Fl, Line 7)

Program develops the propulsion and power technology in support of current and future aerospace vehicles and weapon systems. Includes RDT&E funds for the contract and in-house efforts of the Aerospace Propulsion Laboratory (AFAPL) located at Wright-Patterson AFB, Ohio.

Aerospace Avionics/VHSI Circuits PE 62204F (Fl, Line 8)

This program develops avionics technology which improves the functions of aerospace vehicle command, control, navigation, penetration, defense, reconnaissance, fire control, and weapon delivery. These improvements will result in higher reliability, and greater mission effectiveness. The program also provides for the operations and management of the Air Force Avionics Laboratory at Wright-Patterson AFB, Ohio.

Aircraft Propulsion Subsystem Integration PE 63202F (Fl, Line 16)

Provides for the design, development and test of new techniques aimed at propulsion/airframe, integration and capability and improved installed performance in advanced aircraft. This program will provide aircraft systems with the potential for longer range, higher speed, lower fuel consumption, high sortie rates, and reduced life cycle costs.

Command/Control/Communications PE 62702F (F1, Line 13)

This program element provides a broad technology base for advancing Air Force mission capabilities in command, control and communications. Six basic technology areas are pursued: surveillance; intelligence; communications and control; information sciences; electronic reliability and electromagnetic compatibility; and electromagnetic radiation, devices and components. The program element also provides for the operation and management of the Rome Air Development Center, Griffiss AFB, and the RADC Deputy for Electronic Technology, Hanscom AFB.

Space Communications PE 63431F (F3, Line 52)

The only Air Force program for advance development of satellite communications system concepts, techniques and technologies. Program identifies, develops, demonstrates, evaluates, and transitions to operational systems the satellite and airborne terminal technology required to support global command, control and data relay communications.

Companion Trainer Aircraft Development PE 64758F (F4, Line 63)

Air Force initiative to investigate the use of an off-the-shelf, low cost, modified business jet to provide B-52 air crews with realistic inflight training in basic airmanship, navigation, crew coordination, and primary mission tasks. This aircraft offers a potential savings of 100 million gallons of fuel per year and would contribute to extending the service life of the aging B-52 aircraft.

Air Force Satellite Communications Systems — PE 33601F (F4, Line 83)

Program consolidates the development, procurement and installation of the ground aircraft and satellite communication equipment needed to satisfy critical needs of the national command authorities and the military commanders-in-chief for worldwide communications.

Advanced Attack Weapons — PE 63609F (F5, Line 97)

Program develops and demonstrates prototype air-to-surface non-nuclear weapons. Funds will be used to develop two wide-area antiarmor munitions: the WASP mini-missile and the Extended Range Antiarmor Munition.

Special Programs — PE 63801F (F6, Line 107)

Limited access program.

Nuclear Weapons Support — PE 64222F (F6, Line 113)

Includes RDT&E funding to provide continuing support for activities that develop hardware associated with nuclear weapons (other than warheads) and activities that provide for safe and effective nuclear weapons delivery.

Night Precision Attack PE 64249 (F6, Line 116)

The Low Altitude Navigation and Targeting Infrared System for Night (LANTIRN) will provide a capability for low level precision attack and other than optimal weather conditions in air-to-surface interdiction and close air support missions.

Advanced Medium-Range Air-to-Air Missile PE 64314F (F6, Line 118)

A joint Air Force/Navy program to develop an AIM-7/SPARROW follow-on air superiority air-to-air missile, compatible with the F-14, F-15, F-16, F-18 and appropriate NATO aircraft. The first guided test vehicle firing is planned for late FY 1983.

Air Launched ASSAULT BREAKER PE 64616F (F6, Line 129)

System will provide conventional standoff antiarmor warfare capability. System consists of ASSAULT BREAKER air-launched missiles and PAVE MOVER target acquisition and missile guidance commands.

Precison Location Strike System PE 64742F (F7, Line 143)

Program is designed to develop and test a tactical strike system primarily to suppress enemy air defenses. System was rated by 1977 Air Force/Army Tactical Reconnaissance Force Mix Study as the highest priority system in terms of cost versus payoff.

Joint Tactical Information Distribution System (JTIDS) PE 64754F (F7, Line 148)

A joint service program, to develop a time-ordered, secure, jam-resistant, low intercept potential, digital information distribution system for use in a tactical combat environment.

F-4, F-15, A-10 and F-16 Squadrons

F-4	PE 27128F (F8, Line 153)
F-15	PE 27130F (F8, Line 155)
A-10	PE 27131F (F8, Line 156)
F-16	PE 27133F (F8, Line 157)

Programs provide for engineering design and development of systems update as required. Continuing programs include flight tests, management engineering support and systems integration.

Tactical Airborne Command Control Systems PE 27417F (F8, Line 165)

Program has as its main purpose the development and acquisition of an airborne surveillance system for command and control of tactical forces and strategic defense of the United States. Includes the manpower authorization, peculiar and support equipment, necessary facilities, and the associated costs specifically identified and attributable to the Airborne Warning and Control System (AWACS).

Special Activites PE 34111F (F9, Line 187)

Limited access program.

Space Test Program PE 63402F (F10, Line 194)

Program funds space flight for demonstrating new system design and concept and for determining environmental effects on military systems. The space test program is to be the pathfinder for exploiting the space shuttle as a manned space laboratory.

Aircraft Engine Component Improvement Program PE 64268F (F6, Line 117)

Aircraft Engine Component Improvement Programs (ECIP) are initiated after an engine/component is accepted by the Air Force. System changes continue throughout the operational life of a system. These programs provide engineering support required to obtain engine changes which are essential for satisfactory system performance in operational use.

Space Shuttle PE 64411F (F10, Line 199)
Program has as its main objectives: (1) supporting NASA development and assuring the utility to DOD of the Space Transportation System; (2) transitioning critical national defense satellites to the space shuttle; (3) developing an inertial upper stage for use with the Space Shuttle, and (4) acquiring and operating general purpose space shuttle launch and landing facilities at Vandenberg AFB, California.

Acquisition and Command Support PE 65806F (F10, Line 205)
Provides funding support for the Headquarters Air Force Systems Command, Aeronautical Systems Division, Electronic Systems Division, Aerospace Medical Division, Space Division, Armament Divison and the Ballistic Missile Office.

Test and Evaluation Support PE 65807F (F10, Line 206)
Provides funding support for operating five test activities within the Air Force Systems Command: (1) Arnold Engineering Development Center, (2) Armament and Development Test Center, (3) Air Force Flight Test Center, (4) 4950th Test Wing and (5) the Western Space and Missile Center.

Defense Meteorological Satellite Program PE 35160F (F11, Line 213)

An advanced weather satellite system which provides visual and infrared cloud cover data and other meteorological, oceanographic, and solar-geophysical information over the entire surface of the earth in support of strategic and tactical missions.

Air Force (Procurement)

F-15 A/B/C/D (F2, Line 4 & 5)

Provides for the procurement of F-15 aircraft, a twin engine, swept wing aircraft designed specifically for high maneuverability in air-to-air combat.

F-16 A/B (F2, Lines 6 & 7)

Provides for the procurement of F-16 multi-purpose single-seat, fixed wing, high performance fighter aircraft capable of performing a broad spectrum of tactical air warfare tasks.

KC-10A Advanced Tanker/Cargo Aircraft (F2, Line 8)

Provides for the procurement of tanker/cargo aircraft. A derivative of the currently available wide bodied DC-10 modified to provide a refueling capability and to exploit the cargo-carrying potential inherent in the existing aircraft design.

Tactical Airborne Command and Control System (AWACS) E-3A (F2, Line 9; F3, Line 10)

Provides for the procurement of E-3A (AWACS) aircraft. E-3A is a survivable airborne surveillance, command and control communications system which consists of special avionics and a large surveillance radar installed in a modified Boeing 707-320B airframe. Mission is to provide battle management in conducting air warfare in a tactical theater and strategic air defense.

TR-1A (F3, Line 15 & 16)

Provides for the procurement of TR-1A aircraft, a variant of the U-2R aircraft, to provide a high altitude, stand-off battlefield surveillance/reconnaissance capability for theater/tactical commanders. Equipped with the latest electronic sensors being developed in other programs, the TR-1 will provide an effective battlefield surveillance system into the 1990's.

A-10 Modifications (F4, Line 21)

Program provides for continuation of A-10 update efforts. Program includes initiation of an engine monitoring system, and the SEEK TALK jam-resistant radio program, and continuation of an inertial navigation system.

F/RF-4 Modifications (F4, Line 22)

Provides for the continuation of previously initated modifications which include *inter alia*: a chaff and flare dispenser capability; radar warning upgrade; replacement of the inertial navigation system; and various safety and reliability improvements.

F-15 Modifications (F4, Line 24)

Program includes continuation of previously initiated modifications and initiation of a satellite defense capability.

F-16 Modifications (F4, Line 25)

Program continues the update of operational aircraft to a standard configuration and initiates the SEEK TALK anti-jam communications capability.

F-111 Modifications (F4, Line 26)

Program provides for continuation of previously initiated modifications, e.g., secure voice capability, correction of avionic deficiencies, plus initiation of various reliability and safety modifications to the engine and airframe.

EF-111 (F4, Line 27)

The FY 1983 program completes the production buy of the ALQ-99 electronic countermeasure sub-system for EF-111 aircraft. The EF-111 will provide the capability to accomplish all tactical jamming support missions.

C-5 Modifications (F4, Line 29)

Program continues the wing replacement modification necessary to achieve an increased 30,000 flying hour service life, and other previously initiated modifications of lesser magnitude.

C-141 Modifications (F4, Line 30)

This program continues the procurement of a digital flight data recorder, a fuel savings advisory system, the replacement of the rudder power control cylinder and other reliability and safety modifications. Program also initiates procurement of a deployable crisis management capability.

C-130 Modifications (F5, Line 33)

This program continues the wing modification and other efforts begun in previous fiscal years, e.g., various safety improvements, secure voice capability and a modification to conserve fuel.

C-135 Modifications (F5, Line 34)

This program continues funding for 34 modifications to maintain the reliability and extend the service life of the C-135 fleet. Included are: continuation of Phase III Launch Control System for the EC-135 Airborne Launch Control Aircraft; wing reskinning; doppler replacement; a modification to improve fuel consumption; and the initiation of improvements to the Minimum Essential Emergency Communication Network.

E-3A (F5, Line 35)

Provides an airborne surveillance, command, control and communications system for use in both tactical and strategic defensive operations. This program includes both the production of new aircraft and the continuation of ongoing modification programs begun in prior fiscal years.

Other Aircraft Modifications (F5, Line 40)

These funds are required for previously initiated modifications e.g., modification to the Radar Warning Receiver Signal Processor; replacement of HF and VHF AM/FM radios; replacement of low and high altitude radar altimeters and other modifications on a variety of aircraft.

Classified Projects (other aircraft modifications) (F5, Line 42)

Limited access program.

Civil Reserve Airlift Fleet (CRAF) (F5, Line 44)

Program funds incorporation of cargo convertibility features in U.S. wide-body passenger aircraft during initial production or as a retrofit to enhance intertheater aircraft capability without increasing Air Force aircraft inventory.

Spares and Repair Parts (Aircraft) (F5, Line 45)

Program provides for the initial procurement of weapon system spares, modification spares and common usage spares.

Common Ground Equipment (F6, Line 46)

Program provides for the procurement of organizational base and depot level support equipment for out-of-production aircraft and for common support equipment for new aircraft entering the inventory.

Industrial Facilities (F6, Line 47)

Program provides for capital type rehabilitation of real property at Air Force owned industrial facilities and finances preparation of government production equipment for shipment. Funds are used to bring Air Force plants to environmental standards, to reduce energy consumption and for improvements of manufacturing methods.

War Consumables (F6, Line 48)

Provides additional wartime support required in the event of hostilities to sustain operations until production can be expanded.

Other Production Charges (F6, Line 49)

This program provides for items that are not directly related to specific aircraft procurement lines and cannot be reasonably allocated and charged thereto. It also includes items such as airborne electronic counter-measure pods that are used by more than one weapon system and managed as end items themselves.

NATO Airborne Warning and Control System (F6, Line 50)

This program provides the United States' share of acquisition, operation and support costs of the NATO AWACS program. This AWACS force will provide improved air defense and counter-air operations for NATO forces.

AIM-7F/M SPARROW (F9, Line 11)

Provides funds for procurement of SPARROW missiles. The SPARROW is a rocket-propelled, semi-active, radar guided, air-to-air missile. Provides US aircraft with an all-aspect capability under all-weather conditions against high performance air-to-air enemy aircraft.

AIM-9L/M SIDEWINDER (F9, Line 12)

Provides for procurement of SIDEWINDER missiles. The SIDEWINDER is an infrared, short-range, air-to-air missile designed for visual attack. The missile is carried by both Navy and Air Force fighter and attack aircraft for use against all enemy aircraft.

AGM-65D MAVERICK (F9, Line 14)

Provides for procurement of MAVERICK missiles. The MAVERICK missile is an air-to-ground system which incorporates infrared technology to provide an effective day-night-adverse weather weapon system.

AGM-88A HARM (F9, Line 15)

Provides for the initial procurement of HARM missiles for the Air Force. The HARM is an air-to-surface, anti-radiation missile designed to damage or suppress radar-directed air defense weapons.

RAPIER (F9, Line 16)

Continues procurement of the RAPIER air defense system. The RAPIER is a short-range, low-level, all-weather, ground-to-air missile system. Produced in the United Kingdom, it will be used to defend United States air bases in the UK.

Class IV (F9, Line 19)

Program will provide for modifications to improve reliability, maintainability, and extend service life of the AGM-45 SHRIKE, AIM-4 FALCON, LGM-30 MINUTEMAN and the Emergency Rocket Communications System. It will also initiate modifications to the BQM-34 Target Drone and update modifications to the Ground Launched Cruise Missile.

Spares and Repair Parts (Missiles) (F10, Line 24)

Provides for procurement of initial and replenishment spares and repair parts for: ballistic missiles; other missiles; target drones; support, training, and replacement equipment; and spares for modification programs.

Satellite Data System (F10, Line 29)

A multi-purpose communication system which, with the Navy Fleet Satellite Communications Program, supports communications for strategic forces and between Air Force Satellite Control Facility ground stations.

Defense Meteorological Satellite Program (DMSP) (F10, Line 30)

DMSP is a satellite program which provides timely, high-quality visual and infrared weather data to support operations of the US Armed Forces. Funds will provide for satellite modifications and procure additional special sensors.

Defense Support Program (F10, Line 31)

DSP satellites contain sensors which provide near real-time data to National Command Authorities and other designated users.

Defense Satellite Communications System (DSCS) (F10, Line 32)

Provides super high frequency (SHF) satellite communications for secure voice and high data rate transmissions responsive to user requirements for command and control, communication intelligence data relay, early warning and space surveillance information, and diplomatic traffic. System consists of four operational and two on-orbit spare satellites. FY 1983 funds required to procure three production satellites.

Space Boosters (F11, Line 35)

Program provides an austere Expendable Launch Vehicle (ELV) backup for the launch of critical USAF operational payloads in the event that the space shuttle program is delayed or the orbiter fleet is grounded. These funds complete two TITAN IIID vehicles and provide for the operation and maintenance of the ELV launch facilities.

Space Shuttle (F11, Line 37)

Program funds procurement of an unmanned inertial upper stage (IUS) for the space shuttle and construction of launch facilities and resources for ensuring that NASA facilities meet DOD security requirements. The IUS will be used by both DOD and NASA.

Special Programs (F11, Line 41)

Limited access programs.

Special Update Programs (F11, Line 42)

Limited access programs.

30MM Training/HEI/API/Cartridges (F13, Line 8-10)

Provides 30MM Training/HEI/API cartridges. 30MM is designed for use on the A-10 aircraft. Used with the GAU 8 gun system, the 30MM is effective against a broad spectrum of close air-support targets. System is specifically designed to defeat Soviet medium/heavy tanks.

Laser Bomb Guidance Kit (F14, Line 20)

Kit consists of a field installed computer control group and an airfoil group for the MK-82, 83 and 84 bombs. Control group detects laser energy reflected from a target illuminated by either a ground or airborne laser target designator and directs the laser guided bomb on a line-of-sight trajectory to the target.

Tactical Air Control System Improvement (F19, Line 123)

Program provides tactical commanders with mobile communications and electronic equipment required to control deployed tactical forces.

Defense Support Program (F19, Line 125)

A continuing program which provides classified support to the National Command Authorities.

Minimally Attended Radar System (F19, Line 131)

Program to upgrade the Alaskan Air Command sensor capability with modern search radars. It will be capable of operating unattended up to five days.

Automatic Data Processing Equipment (F20, Line 138)

Program provides automatic data processing equipment necessary for the Air Force mission.

Air Base Defense System (F20, Line 144)

Program provides for increased security protection of alert aircraft and special weapon storage areas through procurement and deployment of physical security sensor systems.

Range Improvement Equipment (F20, Line 147)

Provides instrumentation and equipment necessary to support the operational range mission. The primary function of this improved capability is to provide more effective tests, evaluation and training capability.

Joint Tactical Communications Program (TRI-T) (F21, Line 160)

Program funds a joint service effort to develop and acquire tactical communications equipment.

Training Support Equipment (F21, Line 173)

Program procures threat radar and early warning radar simulator systems for use on USAF operational test and training ranges and SAC strategic training ranges. Simulator systems provide a realistic combat environment for aircrew training and operational test and evaluation of weapons systems.

Spares and Repair Parts (Communications & Electronics) (F22, Line 179)

Provides funds for initial and replenishment spares and repair parts for Air Force communications and electronic equipment.

Base Procured Equipment (F23, Line 211)

Provides funds for local procurement of equipment that must be acquired directly from GSA, DLA, the other services, or commercial concerns.

Selected Activities (F24, Line 235)

Limited access activities.

Special Update Program (F24, Line 236)

Limited access program.

DEFENSE AGENCIES (RDT&E)

Defense Research Sciences PE 61101E (D1, Line 1)

A DARPA program to explore new materials, processing, structures, and devise concepts and demonstrate innovative solutions for overcoming materials-related limitations or barriers to advancement in the capability of advanced bearings; rapid-solidification technology; improved propulsion engines; structural and optical components for space laser and surveillance systems; and for missile systems; electro-optical sensors; optical communication systems; high performance microelectronic circuits; infrared imaging focal planes; and special devices and materials for DOD application.

Tactical Technology PE 62702E (D1, Line 6)

A DARPA program dedicated to the development of advanced tactical technologies and concepts that will serve as the basis for development of the next generation of tactical systems. Program goal is to advance non-nuclear, tactical, combat capabilities with careful consideration to realistic costs and service manpower constraints.

Integrated Command/Control Technology PE 62708E (D1, Line 9)

A DARPA program to develop advanced information processing, computer-communications and command system cybernetics technology which can provide the technology base for future command and control systems.

Defense Nuclear Agency PE 62715H (D1, Line 15)

Program provides for the development of nuclear weapons effects information necessary to evaluate survivability/vulnerability of United States military systems and understand/exploit weaknesses in enemy forces.

Cryptologic Activities PE 31011G (D2, Line 25)

Limited access program.

Communication Security PE 33401G (D2, Line 28)

Limited access program.

Defense Reconnaissance Support Activities PE 35159I (D2, Line 29)

Limited access program.

Tactical Cryptological Activities PE 35885G (D2, Line 30)

Limited access program.

WWMCCS Systems Engineer PE 320198 (D11, Line 20)

A DCA program which supports the worldwide Military Command and Control System which provides the National Command Authorities and Senior Military Commanders with essential information pertaining to the need for action by United States military forces and disseminates their decisions and orders to those forces.

DEFENSE AGENCIES (Procurement)

Classified Equipment (D2, Line 2)

Limited access program.

DEPARTMENT OF ENERGY PROGRAMS

Activities related to these programs predominantly provide for normal maintenance and reliability assessment of the nuclear stockpile. Since these programs do not provide for additional warheads/bombs or for significant changes in characteristics or deployments, none of them are judged to have a significant impact on arms control policy or negotiations.

W71 -- A nuclear warhead developed for the SPARTAN, a long-range interceptor missile. The W71 has been deactivated and placed in a no-maintenance status in storage depots.

W70, Mods 1 and 2 -- A nuclear warhead developed for the LANCE, a mobile, surface-to-surface ballistic missile system.

W69 -- A nuclear warhead deployed in the AGM-69A Short-Range Attack Missile (SRAM) which was developed as a defense-suppression and stand-off missile for carriage on the B-52 and FB-111 aircraft.

W68 -- The nuclear warhead for the MK-3 re-entry body which is carried on the POSEIDON Fleet Ballistic Missile. Each missile has the capability of independently targeting multiple warheads.

W66 -- A nuclear warhead developed for the SPRINT, a short-range interceptor missile. The W66 has been deactivated and placed in a non-maintenance status in storage depots.

W62 -- A nuclear warhead deployed in a current MK-12 re-entry vehicle on the MINUTEMAN III missile. This system provides a multiple independently targetable re-entry vehicle (MIRV) capability.

B61, Mods 0, 1, 2, 3, 4, 5 -- A lightweight, multi-purpose, aircraft-delivered, nuclear gravity bomb.

W58 -- The nuclear warhead for the MK-2 re-entry body, which is carried on the POLARIS A-3 ballistic missile.

B57 Bomb -- A lightweight, aircraft delivered, multi-purpose, nuclear depth charge or gravity bomb.

W56-4 -- A nuclear warhead for the MK-11 re-entry vehicle carried on the MINUTEMAN II ballistic missile.

W55 -- A nuclear warhead used with the Submarine Rocket (SUBROC), a rocket-propelled, nuclear depth bomb that is used against submarine targets.

W54 -- A nuclear warhead used in the Special Atomic Demolition Munition (SADM) application.

W53 -- A nuclear warhead designed to be used as a payload in the MK-6 re-entry vehicle for the TITAN II ICBM.

B53 -- A nuclear bomb designed to be delivered from a B-52 aircraft.

W50 -- A nuclear warhead used in MGM-31A and MGM-31B (PERSHING) field artillery missiles.

W48 155mm AFAP -- A nuclear warhead for the 155mm artillery-fired atomic projectile (AFAP).

W45-1 -- A warhead which provides a nuclear capability for the Navy's TERRIER surface-to-air guided missile, designed as anti-aircraft armament for guided missile cruisers and some aircraft carriers.

W45-3,-4 Medium Atomic Demolition Munitions (MADM) -- A warhead which provides the Army with an atomic demolition munition.

W44 Depth Charge -- A nuclear warhead which is used with the anti-submarine rocket (ASROC) missile, providing surface combatant ships with a nuclear depth charge capability.

B43 -- A nuclear gravity bomb that can be delivered by most of the nuclear-capable strategic and tactical aircraft in the US inventory.

W33 8-inch AFAP -- A nuclear warhead for the Army 8-inch artillery-fired atomic projectile, fired from the M110 and M115 howitzers.

W31 -- A nuclear warhead for both the HONEST JOHN free-flight surface-to-surface missile and the NIKE HERCULES surface-to-air guided missile.

B28 -- A nuclear gravity bomb that can be delivered by a varity of aircraft in the US inventory.

W25 -- The nuclear warhead for the AIR-2A (GENIE) unguided air-to-air rocket designed for use against enemy aircraft.

APPENDIX

GLOSSARY OF PERTINENT TERMS AND ACRONYMS

ABM SYSTEM:	A system to counter strategic ballistic missiles or their elements in flight trajectory, currently consisting of: 1) ABM interceptor missiles, which are interceptor missiles constructed and deployed for an ABM role, or of a type tested in an ABM mode; 2) ABM launchers, which are launchers constructed for launching ABM interceptor missiles; 3) ABM radars, which are radars constructed and deployed for an ABM role, or of a type tested in an ABM mode.
ABM TREATY:	This Treaty is one of the two agreements signed at Moscow on May 26, 1972, known collectively as the SALT I agreements. The original ABM Treaty limited each side to two ABM deployment areas (one national capital area and one ICBM silo launcher area) with restrictions on the deployment of ABM launchers and interceptors (100 of each per area) and ABM radars at these areas. A protocol to the Treaty signed in 1974 further restricted each side to only one ABM deployment area.
ACCIDENTAL ATTACK:	An unintended attack which occurs without deliberate national design as a direct result of a random event, such as a mechanical failure, a simple human error, or an unauthorized action by a subordinate.
ACCIDENTAL WAR:	See ACCIDENTAL ATTACK.
ACCURACY OF FIRE:	The measure of the deviation of fire from the aim point, expressed in terms of distance between the point of aim and the mean point of bursts.
ACTIVE DEFENSE:	The employment of limited offensive action and counterattacks to deny a contested area or position of the enemy. (see also PASSIVE DEFENSE).
ACUTE DOSE:	Total dose of radiation received at one time over a period so short that biological recovery cannot occur.
ACTIVE ELECTRONIC COUNTERMEASURES:	ECM which involve active emissions which may be detected by an enemy such as jamming (the deliberate radiating or re-radiating of electronic signals in order to obliterate or obscure signals the enemy is attempting to receive) or deception (the deliberate radiating or re-radiating of electronic signals to mislead the enemy in his interpretation of signals received by his electronic equipment).

AEROSPACE:	Of, or pertaining to, the earth's envelope of atmosphere and the space above it; two separate entities considered as a single realm for activity in launching, guidance and control of vehicles which will travel in both entities.
AEROSPACE DEFENSE:	All defensive measures designed to destroy attacking enemy aircraft, missiles and space vehicles after they leave the earth's surface, or to nullify or reduce the effectiveness of such attacks; an inclusive term encompassing air defense and space defense.
AGGREGATE:	The SALT II Agreement provides for several "aggregate" numerical limits on various categories of strategic offensive arms. The term "aggregate" refers principally to the overall aggregate of ICBM launchers, SLBM launchers, heavy bombers and ASBM's.
AIRBORNE ALERT:	A state of aircraft readiness wherein combat equipped aircraft are airborne and ready for immediate action. It is designed to reduce reaction time and to increase the survivability factor.
AIR-BREATHING of MISSILE:	A missile with an engine requiring the intake of air for combustion of its fuel, as in a ramjet or turbojet (To be contrasted with the rocket - powered missile, which carries its own oxidizer and can operate beyond the atmosphere).
AIRBURST:	An explosion of a bomb or projectile above the surface as distinguished from an explosion on contact with the surface or after penetration.
AIR DEFENSE:	All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack.
AIRLIFT:	The total weight of personnel and/or cargo that is, or can be carried by air, or that is offered for carriage by air. 2) to transport passengers and cargo by use of aircraft. (see also PAYLOAD)
AIR PORTABLE:	Denotes material which is suitable for transport by an aircraft loaded internally or externally with no more than minor dismantling and reassembling within the capabilities of user units. This term must be qualified to show the extent of air portability.

AIR SUPERIORITY:	That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force.
AIR-TO-AIR MISSILE:	A missile launched from an airborne carrier at a target above the surface.
AIR-TO-SURFACE MISSILE:	A missile launched from an airborne carrier to impact on a surface target.
ALERT:	1) Readiness for action, defense or protection. 2) A warning signal of a real or threatened danger, such as an air attack. 3) the period of time during which troops stand by in response to an alarm. 4) to forewarn; to prepare for action. (see also GROUND ALERT).
ALLOCATION:	The designation of specific numbers and types of aircraft sorties for use during a specified time period or for carrying out an assigned task. Allocation (nuclear): the apportionment of specific numbers and types of nuclear weapons to a commander for a stated time period as a planning factor for use in the development of war plans.
ANTI-RADIATION MISSILES:	A missile which homes passively on a radiation source.
ANTI-SUBMARINE WARFARE:	Operations conducted with the intention of denying the enemy the effective use of his submarines.
APOGEE:	The point at which a missile trajectory or a satellite orbit is farthest from the center of the gravitational field of the controlling body or bodies.
AREA DEFENSE:	Defense of a wide geographical area against missiles and aircraft.
AREA TARGET:	A target consisting of an area rather than a single point.
ARMING:	As applied to explosives, the changing from a safe condition to a state of readiness for initiation. As applied to weapons and ammunition, the changing from a safe condition to a state of readiness for initiation.

ARMORED PERSONNEL CARRIER:	A lightly armored, highly mobile, full tracked vehicle, amphibious and airdropable, used primarily for transporting personnel and their individual equipment during tactical operations. Production modifications or application of special kits permit use as a mortar carrier, command post, flame thrower, antiaircraft artillery chassis, or limited recovery vehicle.
ARMOR PIERCING (CAPPED):	Term applied to armour piercing projectiles which have a face hardened steel cap over the head.
ARMS CONTROL:	A concept which connotes: a) any plan, arrangement, or process, resting upon explicit or implicit international agreement, governing any aspect of the following: the numbers, types and performance characteristics of weapon systems (including their command and control, logistics support arrangements, and any related intelligence gathering mechanisms); and the numerical strength organization, equipment, deployment or employment of the armed forces retained by the parties. It encompasses "disarmament." b. On some occasions those measures taken for the purpose of reducing instability in the military environment.
ARMS STABILITY:	The condition of greater predictability and restraint which lessens the incentives for reactive force buildups.
ASSEMBLY AREA:	1). An area in which a command is assembled preparatory to further action. 2) In a supply installation, the gross area used for collection and combining components into complete units, kits or assemblies.
ASSURED DESTRUCTION:	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike.
ATTENUATION:	Decrease in intensity of a signal, beam, or wave as a result of absorption of energy and of scattering out of the path of a detector, but not including the reduction due to geometric spreading, i.e., the inverse square of distance effect. 2) In mine warfare, the reduction in intensity of an influence as distance from the source increases.
AVIONICS:	The application of electronics to aviation and astronautics.
AZIMUTH:	A direction expressed as a horizontal clockwise angle

	in degrees or mils measured from north. Azimuth resolution is the ability of radar equipment to separate two reflectors at similar ranges but different bearings from a vehicle. Normally the minimum separation distance between the reflectors is quoted and expressed as the angle subtended by the reflectors at the vehicle.
BACK-SCATTER/ BACKSCATTERING:	Radiowave propagation in which the direction of the incident and scattered waves, resolved along a reference direction (usually horizontal), are oppositely directed. A signal received by backscattering is often referred to as backscatter.
BALLISTIC MISSILE:	Any missile designed to follow the trajectory that results when it is acted upon predominantly by gravity and aerodynamic drag after thrust is terminated. Ballistic missiles typically operate outside the atmosphere for a substantial portion of their flight path and are unpowered during most of the flight. (see also INTERCONTINENTAL BALLISTIC MISSILE.
BALLISTIC TRAJECTORY:	The trajectory traced after the propulsive force is terminated and the body is acted upon only by gravity and aerodynamic drag.
BARRIER:	A coordinated series of obstacles designed or employed to canalize, direct, restrict, delay or stop the movement of an opposing force, and to impose additional losses in personnel, time and equipment on the opposing force.
BASE:	(air, land, sea, space). 1) A locality from which operations are projected or supported. 2) An area or locality containing installations which provide logistic or other support.
BATTLEFIELD SURVEILLANCE:	The continuous (all weather, day and night) systematic watch over the battle area to provide timely information for combat intelligence.
BEAM RIDER/ RIDING:	1. A missile guided by a radar, radio, or laser beam. 2. A missile guided by an electronic beam.
BILATERAL NEGOTIATION:	Negotiations between two countries.
BINARY NERVE GAS:	A process which provides for the formation of a lethal chemical agent from two non-lethal constituents by means of a chemical reaction occurring only during flight of the munition to a target. Additional safety and security are achieved by adding the second constituent at the time of preparing the munition for use.

BIOLOGICAL WARFARE:	Employment of living organisms, toxic biological products and plant growth regulators to produce death or casualties in man, animals or plants; or defense against such action.
BLAST:	The brief and rapid movement of air vapor of fluid away from a center of outward pressure, as in an explosion or in the combustion of rocket fuel; the pressure accompanying this movement. This term is commonly used for "explosion," but the two terms may be distinguished.
BOMB DAMAGE ASSESSMENT:	The determination of the effect of all air attacks on targets (e.g., bombs, rockets, or strafe).
BOMBER (Light, Medium, Heavy):	1) Light: A bomber designed for a tactical operating radius of under 1,000 nautical miles at design gross weight and design bomb load. 2) Heavy: A bomber designed for a tactical operating radius over 2,500 nautical miles at design gross weight and design bomb load. 3) Medium: A bomber designed for a tactical operating radius of between 1,000 and 2,500 nautical miles at design gross weight and design bomb load.
BOOSTER:	1) A high explosive element sufficiently sensitive so as to be actuated by small explosive elements in a fuze or primer and powerful enough to cause detonation of the main explosive filling. 2) An auxiliary or initial propulsion system which travels with a missile or aircraft and which may or may not be separate from the parent craft when its impulse has been delivered. A booster system may contain or consist of one or more units.
BURNOUT:	The point in time or in the missile trajectory when combustion of fuels in the rocket engine is terminated by other than programmed cutoff.
CARRIER (Carrier Striking Force):	A naval task force composed of aircraft carriers and supporting combatant ships capable of conducting strike operations.
CENTRAL SYSTEM:	Offensive strategic nuclear weapons systems which the US considers central to the strategic nuclear relationship between the US and USSR (currently consisting of ICBMs, SLBMs, and heavy bombers).

CHEMICAL AGENT:	A solid, liquid, or gas which, through its chemical properties, produces lethal or damaging effects on man, animals, plants or material, or produces a screening or signaling smoke.
CHEMICAL DEFENSE:	The methods, plans and procedures involved in establishing and executing defensive measures against attack by chemical agents.
CHEMICAL WARFARE (OPERATIONS):	Employment of chemical agents (excluding riot agents) to: a) kill, or incapacitate for a significant period of time, man or animals; and b) deny or hinder the use of areas, facilities, or material.
CHRONIC DOSE	Radiation dose absorbed in circumstances such that biological recovery may have been possible. It is arbitrarily accepted that a chronic dose can only mean absorption occurring after 24 hrs following the burst. (See also ACUTE DOSE).
CIRCULAR ERROR PROBABLE:	A measure of the delivery accuracy of a weapon system. It is the radius of a circle around a target of such size that a weapon aimed at the target has a 50% probability of falling within the circle.
CLEAN WEAPON:	A nuclear weapon in which measures have been taken to reduce the amount of residual radioactivity relative to a "normal" weapon of the same energy yield.
CLOSE AIR SUPPORT:	Air attacks against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces.
CLUSTER MUNITION:	1. Groups of bombs released together. A cluster usually consists of fragmentation or incendiary bombs. 2. (land mine warfare)-Component of a pattern laid minefield. It may be antitank, antipersonnel, or mixed. It consists of one to five mines and no more than one antitank mine.
COLD LAUNCH:	The technique of ejecting a missile from a silo before full ignition of the main engine, sometimes called "Pop-up."
COLD WAR:	A state of international tension, wherein political, economic, technological, sociological, psychological, paramilitary, and military measures short of overt armed conflict involving regular military forces are employed to achieve national objectives.

COLLATERAL CASUALATIES & DAMAGE:	The damage to surrounding human and non-human resourc either military or non-military, as the result of action or strikes directed specifically against enemy forces or military facilities.
COMMAND, CONTROL, COMMUNICATIONS:	The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of his mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures which are employed by a commander in planning, directing, cordinating and controlling forces and operations in the accomplishment of his mission.
COMMUNICATIONS SATELLITE:	An orbiting vehicle, which relays signals between communications stations. They are of two types: a. active communications satellite - A satellite which receives, regenerates, and retransmits signals between stations; and b. passive communications satellite - A satellite which reflects communications signals between stations.
CONTAMINATION:	The deposit and/or absorption of radioactive material, biological warfare agents or chemical warfare agents on and by structures, areas, personnel or objects.
CONTOUR FLYING:	Flight at low altitude in which the flight pattern conforms generally to the contours of the area. It is used to avoid observation or detection of an aircraft and/or the points to and from which it is flying.
CONTROLLED RESPONSE:	The selection from a wide variety of feasible options of the one which will provide the specific military response most advantageous in the circumstances.
CONVENTIONAL WEAPON:	Nonnuclear weapons. Excludes all biological weapons, and generally excludes chemical weapons except for existing smoke and incendiary agents, and agents of the riot control type.
COOPERATIVE MEASURES:	Measures taken by one side in order to enhance the other side's ability to verify compliance with the provisions of the agreement. Such measures can be voluntary or negotiated.
COUNTERFORCE:	The employment of strategic air and missile forces in an effort to destroy, or render impotent, selected military capabilities of an enemy force under any of the circumstances by which hostilities may be initiated.

COUPLING (STRATEGIC):	The linking of a lower level conflict, e.g., Soviet/Warsaw Pact military aggression in Europe, to the use of US strategic deterrent forces such as ICBMs, heavy bombers and SLBMs.
CRISIS STABILITY:	A strategic force relationship in which neither side has any incentive to initiate the use of strategic nuclear forces in a crisis situation.
CRUISE MISSILE:	A guided missile which uses aerodynamic lift to offset gravity and propulsion to counteract drag. A cruise missile's flight path remains within the Earth's atmosphere.
CRUISE MISSILE CARRIER:	An aircraft equipped for launching a cruise missile.
DAMAGE ASSESSMENT:	1) The determination of the effect of attacks on targets. 2) A determination of the effect of a compromise of classified information on the national security. 3) The appraisal of the effects of attacks on targets.
DATA LINK, RELAYS:	A communications link whose terminals are suitable for transmission of data.
DECONTAMINATION:	The process of making any person, object or area safe by absorbing, destroying, neutralizing, making harmless, or removing, chemical or biological agents, or by removing radioactive material clinging to or around it.
DECOY:	A model, electromagnetic reflector or other device accompanying a nuclear weapon delivery vehicle in order to mislead enemy defensive systems so as to increase the probability of penetration and weapon delivery.
DEFENSE-IN-DEPTH:	The siting of mutually supporting defense positions designed to absorb and progressively weaken attack, prevent initial observations of the whole position by the enemy and to allow the commander to maneuver his reserve.
DELIBERATE CONCEALMENT:	Measures carried out deliberately to hinder or deliberately to impede verification of compliance with the provisions of the treaty. Deliberate concealment measures could include for example, camouflage, use of coverings, or deliberate denial of telemetric information, such as through the use of telemetry encryption, whenever such measures impede verification of compliance with the provisions of the agreement.

DEMILITARIZED ZONE:	A defined area in which the stationing or concentrating of military forces, or the retention or establishment of military installation of any description, is prohibited.
DEPLOYMENT:	1) The extension or widening of the front of a military unit, extending from a close order to a battle formation. 2) In naval usage, the change from a cruising, approach or contact disposition to a disposition for battle. 3) In a strategic sense, the relocation of forces to desired areas of operation.
DEPRESSED TRAJECTORY:	The trajectory of a ballistic missile fired at an angle to the ground significantly lower than the angle of a minimum energy trajectory. Such a missile rises above the line-of-sight radar horizon at a later state of flight and has a shorter time of flight, thus making detection and tracking more difficult and reducing warning time.
DETERRENCE:	The prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction.
DOPPLER RADAR:	A radar system which differentiates between fixed and moving targets by detecting the apparent change in frequency of the reflected wave due to motion of target or the observer.
DRONE:	A land, sea or air vehicle which is remotely or automatically controlled.
DUAL-CAPABLE WEAPONS:	1) Weapons, weapons systems or vehicles capable of selective equipage with different types or mixes of armament or firepower. 2) Sometimes restricted to weapons capable of handling either nuclear or nonnuclear munitions.
DUAL-MISSION (PURPOSE) WEAPONS:	Weapons which possess the capability for effective application in two or more basically different military functions and/or levels of conflict.
EARLY WARNING:	Early notification of the launch, or approach, of unknown weapons or weapons carriers.
EARMARKED FOR ASSIGNMENT:	Forces which nations have agreed to assign to the operational command or operational control of a NATO/CENTO commander at some future date. In designating such forces, nations should specify when these forces will be available in terms agreed to in the echelon or category systems.

ELECTROMAGNETIC PULSE:	The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device in a surrounding medium. The resulting electric and magetic fields may couple with military systems to produce damaging current and voltage source.
ELECTRO-OPTICS:	The interaction between optics and electronics leading to the transformation of electrical energy into light, or vice versa, with the use of an optical device.
ELECTRONIC COUNTERMEASURES:	That major subdivision of electronic warfare involving actions taken to prevent or reduce the effectiveness of enemy equipment and tactics employing or affected by electromagnetic radiations and to exploit the enemy's use of such radiations.
ELECTRONIC WARFARE:	That division of the military use of electronics involving actions taken to prevent or reduce an enemy's effective use of radiated electromagnetic energy, and actions taken to insure our own effective use of radiated electromagnetic energy.
ELECTRONIC JAMMING:	The deliberate radiation, reradiation or reflection of electromagnetic energy with the object of impairing the use of electronic devices, equipment or systems being used by an enemy.
ENCRYPTION:	Encryption is encoding communications for the purpose of concealing information. In SALT II, this term has been applied to a practice whereby a side alters the manner by which it transmits telemetry from a weapon being tested rendering the information deliberately undecipherable.
ENDOATMOSPHERE:	From sea level to about 40 nautical miles altitude.
EQUIVALENT MEGATONNAGE:	A measure used to compare the destructive potential of differing combinations of nuclear warhead yield against relatively soft countervalue targets. EMT is computed from the expression: $EMT=NY^x$, where N = number of actual warheads of yield Y; Y = yield of the actual warheads in megatons; and x = scaling
ESCALATION:	An increase in scope or violence of a conflict, deliberate or unpremeditated.

ESSENTIAL EQUIVALENCE:	The term as currently used refers to approximate equality in the overall strategic capabilities of the two sides' central systems.
EXOATMOSPHERE:	Higher than about 40 nautical miles above sea level.
EXPOSURE DOSE:	The exposure dose at a given point is a measurement of radiation in relation to its ability to produce ionization.
EXTERNALLY OBSERVABLE DIFFERENCES	Externally observable design features used to distinguish between those heavy bombers of current types [and air-launched cruise missiles] which are capable of performing a particular SALT-limited function and those which are not. These differences need not be functionally related but must be a physical design feature which is externally observable.
FALLOUT:	The precipitation to earth or radioactive particulate matter from a nuclear cloud; also applied to the particular matter itself.
FIREBALL:	The luminous sphere of hot gases which forms a few millionths of a second after detonation of a nuclear weapon and immediately starts expanding and cooling.
FIRE CONTROL:	All operations connected with the planning, preparation, and actual application of fire on a target.
FIRE CONTROL SYSTEM:	Group of interrelated fire control equipment and/or instruments designed for use with a weapon or group of identical weapons.
FIREPOWER:	The amount of fire which may be delivered by a position, unit or weapon system.
FIRST STRIKE:	The first offensive move of a war. (Generally associated with nuclear operations).
FISSION:	The process whereby the nucleus of a particular heavy element splits into (generally) two nuclei of lighter elements, with the release of substantial amounts of energy.
FIXED LAUNCHER: (ICBM):	There are two categories of ICBM launchers - fixed and mobile. Fixed ICBM launchers have traditionally been referred to as either "soft," whereby the missile and most of its launch equipment remain above ground, or "hard," whereby the missile and most of its launch

	equipment are contained in a hardened underground silo. In both cases the launcher - the equipment which launches the missile - is in a fixed location.
FLEXIBLE RESPONSE:	The capability of military forces for effective reaction to any enemy threat or attack with actions appropriate and adaptable to the circumstances existing.
FOCAL PLANE:	The plane, perpendicular to the optical axis of the lens, in which images of points in the object field of the lens are focused.
FORWARD BASED SYSTEMS:	A term introduced by the USSR to refer to those US nuclear systems based in third countries or on aircraft carriers and capable of delivering a nuclear strike against the territory of the USSR.
FORWARD DEFENSE POSITION:	In the mobile defense, any combination of islands of resistance, strong points, and observation posts utilized by the defender to warn of impending attack, canalize the attacking forces into less favorable terrain and block or impede the attacking force. Forward defense positions are occupied by the minimum forces necessary while the bulk of the defending force is employed in offensive action.
FORWARD EDGE OF THE BATTLE AREA: (FEBA)	The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating, designated to coordinate fire support, the positioning of forces or the maneuver of units.
FRACTIONAL ORBITAL BOMBARDMENT SYSTEM:	A missile that achieves an orbital trajectory, but fires a set of retro-rockets before the completion of one revolution in order to slow down, reenter the atmosphere and release the warhead it carries into a normal ballistic trajectory toward its target. While a normal ICBM follows a parabolic path to target, highly visible to defending radars, a weapon in low orbit, e.g., 100 miles, can make a sharp descent to earth, cutting radar warning time substantially. A FOBS path accordingly consists of a launch into low orbit, a partial circle to the earth target, and a rapid descent.
FRACTIONATION:	The division of the payload of a missile into several warheads. The use of a MIRV payload is an example of fractionation.

FUEL EXHAUSTION RANGE:	The total store of fuel assumed to be burned and no fuel reserve held back. Fuel exhaustion range is the range definition for cruise missiles in the SALT II Treaty.
FUNCTIONALLY RELATED OBSERVABLE DIFFERENCES: (FRODs)	The means by which SALT II provides for distinguishing between those aircraft which are capable of performing certain SALT-limited functions and those which are not. FRODs are differences in the observable features of airplanes which specifically determine whether or not these airplanes can perform the mission of a heavy bomber or whether or not they can perform the mission of a bomber equipped for cruise missiles of a range in excess of 600 km, or whether or not they can perform the mission of a bomber equipped for ASBMs.
FUSION:	The process accompanied by the release of tremendous amounts of energy, whereby the nuclei of light elements combine to form the nucleus of a heavier element.
GENERAL WAR:	Armed conflict between major powers in which the total resources of the belligerents are employed, and the national survival of a major belligerent is in jeopardy.
GLIDE BOMB:	A bomb fitted with air foils to provide lift, carried and released in the direction of a target by an airplane.
GROUND ALERT:	That status in which aircraft on the ground/deck are fully serviced and armed, with combat crews in readiness to take off within a specified short period of time (usually 15 minutes) after receipt of a mission order.
GROUND SUPPORT:	See CLOSE AIR SUPPORT.
GROUND ZERO:	The point on the surface of the earth at, or vertically below or above, the center of a planned or actual nuclear detonation. Also called GZ.
GUIDANCE:	The entire process by which target intelligence information received by the guided missile is used to effect proper flight control to cause timely direction changes for effective target interception.
GUIDED MISSILE:	An unmanned vehicle moving above the surface of the earth, whose trajectory or flight path is capable of being altered by an external or internal mechanism.

HALF-LIFE:	The time required for the activity of a given radioactive species to decrease to half of its initial value due to radioactive decay. The half-life is a characteristic property of each radioactive species and is independent of its amount or condition.
HARDENED SITE:	A site constructed to withstand the blast and associated effects of a nuclear attack and likely to be protected against a chemical, biological, or radiological attack.
HEAVY BALLISTIC MISSILE:	For the purpose of SALT II, ballistic missiles are divided into two categories according to their throw-weight and launch-weight: light and heavy. Heavy missiles (ICBM's, SLBM's, and ASBM's) are those missiles which have a launch-weight greater or a throw-weight greater than the launch-weight or throw-weight of the Soviet SS-19 ICBM.
HEIGHT OF BURST:	1) The vertical distance from the earth's surface or target to the point of burst. 2) For nuclear weapons, the optimum height of burst for a particular target (or area) is that at which it is estimated a weapon of a specific energy yield will produce a certain desired effect over the maximum possible area.
HIGH EXPLOSIVE:	Generally applied to the bursting charges for bombs, projectiles, grenades, mines and demolition charges.
HOMING:	The technique of tracking along a position line towards the point of origin of a radio, radar or other navigation aid.
HOMING GUIDANCE:	A system by which a missile steers itself toward a target by means of a self-contained mechanism which is activated by some distinguishing characteristics of the target.
HOMING OVERLAY EXPERIMENT: (HOE)	The HOE is designed to demonstrate the ability of optics to acquire targets in flight; isolate RVs from accompanying chaff, penetration aids, and booster fragments; and guide the missile to intercept with a goal of a miss distance small enough to permit RV destruction by other than nuclear means. HOE would demonstrate the capability and illustrate the advantages of exoatmosphere, non-nuclear intercept at relatively long ranges.
HOWITZER:	A cannon which combines certain characteristics of guns and mortars. The howitzer delivers projectiles with medium velocities, either by low or high trajectories.

HYPERGOBIC FUEL:	Fuel which will spontaneously ignite with an oxidizer, such as aniline with fuming nitric acid. It is used as the propulsion agent in certain missile systems.
ICBM SILO LAUNCHER:	An ICBM silo launcher, a "hard" fixed ICBM launcher, is an underground installation, constructed primarily of steel and concrete, housing an intercontinental ballistic missile and the equipment for launching it.
INDISCRIMINATE USE:	The placement of a munition which a) is not on, or directed against, a military objective; b) employs a method or means of delivery which cannot be directed at a specific military objective; or c) may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.
INDUCED RADIATION:	Radiation produced as a result of exposure to radioactive material, particularly the capture of neutrons.
INERTIAL CONFINEMENT:	A concept for attaining the density and temperature condition that will produce nuclear fusion by use of lasers or other high power sources to compress and heat small pellets containing fusionable fuel. The energy released is in the form of fast neutrons, X-rays, charged particles, and debris, and can be used in much the same way as the energy output of any other fusion (or fission) process.
INERTIAL GUIDANCE:	A guidance system designed to project a missile over a predetermined path, wherein the path of the missile is adjusted after launch by devices wholly within the missile and independent of outside information. The system measures and converts accelerations experienced to distance traveled in a certain direction.
INERTIAL NAVIGATION SYSTEM:	A guidance system designed to project a missile to a predetermined point on the earth's surfce by measuring acceleration and noting changes in any one direction. The system is insensitive to jamming, atmospheric conditions in the launcher area and other forms of interference.
INITIAL OPERATIONAL CAPABILITY: (IOC)	The date when the first combat missile unit is equipped, trained and logistic support established to permit performance of combat missions in the field. An initial operational capability date is associated with each new missile system as a target date for delivery of combat equipment, repair parts, maintenance equipment and publications plus supply of trained personnel.

INITIAL RADIATION:	The radiation, essentially neutrons and gamma rays resulting from a nuclear burst and emitted from the fireball within one minute after burst.
INSPECTION:	In arms control, the physical process of determining compliance with arms control measures.
INTERCEPTOR:	A manned aircraft utilized for identification and/or engagement of airborne objects.
INTERCONTINENTAL BALLISTIC MISSILE: (ICBM)	A land-based fixed or mobile rocket-propelled vehicle capable of delivering a warhead to intercontinental ranges. Once they are outside the atmosphere, ICBMs fly to a target on an elliptical trajectory. An ICBM consists of a booster, one or more reentry vehicles, possibly penetration aids, and, in the case of a MIRV'ed missile, a post-boost vehicle. For the purposes of SALT II, an ICBM is considered to be a land-based ballistic missile capable of a ballistic missile capable of a range in excess of 5,500 km (about 3,000 nautical miles).
INTERDICT:	To prevent or hinder, by any means, enemy use of a route or area.
INTERFERENCE:	The SALT II treaty provides that each party shall use national technical means (NTM) of verification at its disposal to provide assurance of compliance with the treaty. In this connection, each party has undertaken a commitment not to interfere with the NTM of the other party. This means that neither side can destroy or attempt to negate the functioning of the NTM of the other side (e.g., blinding of photoreconnaissance satellites).
INTERMEDIATE RANGE BALLISTIC MISSILE:	A ballistic missile, with a range capability from about 1,500 to 3,000 nautical miles. See ICBM.
KILL PROBABLE (PROBABILITY):	A measure of the probability of destroying a target.
KILOTON WEAPON:	A nuclear weapon, the yield of which is measured in terms of thousands of tons of trinitrotoluene explosive equivalents, producing yields from 1 to 199 kilotons.
LAUNCH:	Transition from static repose to dynamic flight of a missile. For the purpose of SALT II, a launch includes a flight of a missile for testing, training, or any other purpose. The term "launch" would not encompass so-called pop-up tests which are tests of the launcher and ejection mechanism.

LAUNCHER:	That equipment which launches a missile. ICBM launchers are land-based launchers which can be either fixed or mobile. SLBM launchers are the missile tubes on a ballistic missile submarine. An ASBM launcher is the carrier aircraft with associated equipment launchers for cruise missiles can be installed on aircraft, ships, or land-based vehicles or installations.
LAUNCHING SITE:	Any site or installation with the capability of launching missiles from surface-to-air or surface-to-surface.
LAUNCH-ON-WARNING:	A doctrine calling for the launch of ballistic missiles when a missile attack against them is detected and before the attacking warheads reach their targets.
LAUNCH PAD:	A concrete or other hard surface area on which a missile launcher is positioned.
LAUNCH WEIGHT:	The weight of the fully loaded missile itself at the time of launch. This would include the aggregate postboost vehicle (PBV) and the payload.
LIGHT (BALLISTIC MISSILE):	For the purposes of SALT II, ballistic missile are divided into two categories according to their throw-weight and launch-weight: light and heavy. The Soviet SS-19 ICBM is acknowledged by both sides as the heaviest of the existing light ICBM's on either side.
LINES OF COMMUNICATION:	All the routes, land, water, and air, which connect an operating military force with a base of operations and along which supplies and military forces move.
LOCK-ON:	Signifies that a tracking or target seeking system is continuously and automatically tracking a target in one or more coordinates (e.g., range, bearing, elevation).
LOGISTICS:	The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with: a. design and development, acquisition, storage, movement, distribution, maintenance, evacuation and disposition of materiel; b. movement, evacuation and hospitalization of personnel; c. acquisition or construction, maintenance, operation and disposition of facilities; and d. acquisition or furnishing of services.
MACH NUMBER:	The ratio of the velocity of a body to that of sound in the surrounding medium.

MANEUVERABLE REENTRY VEHICLE:	A reentry vehicle capable of performing preplanned flight maneuvers during the reentry phase.
MAXIMUM RANGE:	The greatest distance a weapon can fire without consideration of dispersion, or the greatest distance a weapon system can fly.
MEDIAN LETHAL DOSE:	1. (Nuclear) The amount of radiation over the whole body which would be fatal to 50 percent of the animals or organisms in question in a given period of time. 2. (Chemical). The dose of toxic chemical agent which will kill 50 percent of exposed unprotected personnel. It is expressed in milligram minutes per cubic centimeter.
MEDIUM-RANGE BALLISTIC MISSILE:	A ballistic missile with a range capability from about 600 to 1,500 nautical miles.
MEGATON:	A unit of measurement for nuclear yield equivalent to the energy released from one million tons of TNT.
MIDCOURSE GUIDANCE:	The guidance applied to a missile between termination of the launching phase and the start of the terminal phase of flight.
MOBILE (ICBM) LAUNCHER:	Equipment which launches an ICBM and which can move or be moved from one location to another. Mobile ICBM launchers could include ICBM launchers on wheeled vehicles, launchers on vehicles which travel on rails, and launchers which are moved among launch-points which might themselves be "hard" or "soft."
MOBILITY:	A quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission.
MULTILATERAL NEGOTIATIONS:	Negotiations between more than two countries.
MULTIPLE INDEPENDENTLY-TARGETABLE REENTRY VEHICLE (MIRV)	Multiple reentry vehicles carried by a ballistic missile, each of which can be directed to a separate and arbitrarily located target. A MIRV'ed missile employs a post-boost vehicle (PBV) or other warhead dispensing mechanism. The dispensing and targeting mechanism maneuvers to achieve successive desired position and velocities to dispense each RV on a trajectory to attack the desired target, or the RV's might themselves maneuver toward their targets after they reenter the atmosphere.
MULTIPLE REENTRY VEHICLE:	The reentry vehicle of a ballistic missile equipped with multiple warheads where the missile does not have the capability of independently targeting the reentry vehicles - as distinct from a missile equipped for MIRV's.

MUTUAL ASSURED DESTRUCTION: (MAD)	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike. MAD is a condition in which assured destruction capability is possessed by opposing sides.
MUTUAL BALANCED FORCE REDUCTIONS:	An on-going negotiation between NATO/Warsaw Pact countries on the reduction and limitation of military forces in central Europe. As presently structured, phase One of a negotiated agreement would involves force reductions between the US and USSR; Phase Two would involve reduction of force to a common collective ceiling of 700,000 ground troops or 900,000 ground and air units combined for each side.
MX (MISSILE EXPERIMENTAL):	A new US ICBM developed to replace the increasingly vulnerable ICBM force and designed to fit a mobile mode.
NATIONAL TECHNICAL MEANS: (NTM)	Assets which are under national control for monitoring compliance with the provision of an agreement. NTM include photographic reconnaisance satellites aircraft-based systems (such as radars and optical systems, as well as sea and ground-based systems such as radars and antennas for collecting telemetry).
REAR-REAL TIME (WARNING):	Delay caused by automated processing and display, between the occurrence of an event and reception of the data at some other location.
NIGHT/ADVERSE WEATHER:	Technological capabilities permitting devices or vehicles so equipped to operate in the dark or in non-clear daylight conditions.
NON-CIRCUMVENTION:	SALT II provides that each party undertakes not to circumvent the provisions of this treaty through any other state or states or in any other manner. This provision simply makes explicit the inherent obligation any state assumes when party to an international agreement not to circumvent the provisions of that agreement. This provision will not affect existing pattern of collaboration and cooperation with our allies, including cooperation in moderization of allied forces.
NORTH ATLANTIC TREATY ORGANIZATION NATO:	An organization, also known as the Atlantic Alliance, consisting of the signatories of the North Atlantic Treaty. Present members are Belguim, United Kingdom, Canada, Denmark, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Turkey, West Germany, and the US. France signed the Treaty but is no longer an effective member.
NUCLEAR AIRBURST:	The explosion of a nuclear weapon in the air, at height greater than the maximum radius of the fireball.

NUCLEAR DAMAGE ASSESSMENT:	The determination of the damage effect to the population, forces and resources resulting from actual nuclear attack. It is performed during the transattack and post-attack periods. It does not include the functions of evaluating the operational significance of nuclear damage assessments.
NUCLEAR DETONATION:	An explosion resulting from fission and/or fusion reductions in nuclear materials, such as that from a nuclear weapon.
NUCLEAR RADIATION:	Particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from the weapons standpoint, are alpha and beta paticles, gamma rays, and neutrons.
NUCLEAR SURFACE BURST:	An explosion of a nuclear weapon at the surface of land or water; or above the surface, at a height less tnan the maximum radius of the fireball.
NUCLEAR WEAPON:	A device in which the explosion results from the energy released by reactions involving atomic nuclei, either fission or fusion, or both.
NUCLEAR YIELD:	The energy released in the detonation of a nuclear weapon, measured in terms of kilotons or megatons of trinitrotoluene required to produce the same energy release. Yields are categorized as: Very Low - less than 1 kiloton; Low - 1 kiloton to 10 kilotons; Medium - over 10 kilotons to 50 kilotons; High - over 50 kilotons to 500 kilotons; Very High - over 500 kilotons.
OBSERVABLE DIFFERENCES:	See EXTERNALLY OBSERVABLE DIFFERENCES.
OPTICAL SCENE MATCHING CORRELATION:	A form of terminal guidance on missles which can distinguish the target from ground clutter.
OPTIMUM HEIGHT:	The height of an explosive which will produce the maximum effect against a given target.
ORBITAL (BOMB) INJECTION :	The process of providing a space vehicle with sufficent velocity to establish an orbit.
OVER PRESSURE:	The pressure resulting from the blast wave of an explosion. It is referred to as "positive" when it exceeds atmospheric pressure and "negative" during the passage of the wave when resulting pressures are less than atmospheric pressure.

PASSIVE DEFENSE:	Measures taken to reduce the probability of, and to minimize the effects of, damage caused by hostile action without the intention of taking the initiative.
PASSIVE ELECTRONIC COUNTER-MEASURES	ECM without active transmission by the originator, such as intercept search for enemy electronic emissions and tactical evasion (measures taken to impede detection and tracking by the enemy).
PASSIVE HOMING GUIDANCE:	A system of homing guidance wherein the receiver in the missile utilizes radiations from the target.
PAYLOAD:	Weapons and pentration aids carried by a delivery vehicle. In the case of a ballistic missile, the RV(s) and antiballistic missile penetration aids placed on ballistic trajectories by the main propulsion stages or the PBV; in the case of a bomber, those bombs, missiles, or penaids carried internally or attached to the wing or fuselage.
PEAK OVERPRESSURE:	The maximum value of overpressure at a given location which is generally experienced at the instant the shock (or blast) wave reaches that location.
PENETRATION AIDS (ACTIVE & PASSIVE):	Devices employed by offensive weapon systems, such as ballistic missiles and bombers, to increase the probability of penetrating enemy defenses. They are frequently designed to simulate or to mask an aircraft or ballistic missile warhead in order to mislead enemy radar and/or divert defensive antiaricraft or antimissile fire.
PERIGEE:	The point at which a satellite orbit is the least distance from the center of the gravitational field of the controlling body or bodies.
POST-BOOST VEHICLE (PBV):	Often referred to as a "bus", the PBV is that part of a missile which carries the reentry and thrust devices for altering the ballistic flight path so that the reentry vehicles can be dispensed sequentially toward different targets (MIRVs). Ballistic missiles with single RV's also might use a PBV to increase the accuracy of the RV by placing it more precisely into the desired trajectory.
PRE-LAUNCH SURVIVABILITY:	The probability that a delivery and/or launch vehicle will survive an enemy attack under an established condition of warning.
PRE-EMPTIVE ATTACK:	An attack initiated on the basis of incontrovertible evidence that an enemy attack is immenent.
PRE-POSITION	To place military units, equipment or supplies

	at or near the point of planned use or at a designated location to reduce reaction time and to insure timely support of a specific force during initial phases of an operation; (POMCUS).
PROBABILITY OF DAMAGE:	The probability that damage will occur to a target expressed as a percentage or as a decimal.
PROCUREMENT:	The process of obtaining personnel, service, supplies and equipment.
PRODUCTION LEAD TIME:	The time interval between the placement of a contract and receipt into the supply system of material purchased. Two entries are provided: a. initial - the time interval if the item is not under production as of the date of contract placement. b. reorder - the time interval if the item is under production as of the date of contract placement.
PROJECTILE:	An object projected by an applied exterior force and continuing in motion, as a bullet, bomb, applied to rockets and to guided missiles.
PROLIFERATION (NUCLEAR WEAPONS):	The process by which one nation after another comes into possession of, or into the right to determine the use of nuclear weapons.
PROPELLANT:	That which provides the energy required for propelling a projectile. Specifically, an explosive charge for propelling a bullet, shell or the like; also a fuel, either solid or liquid, for propelling a rocket or missile.
PROPULSION TECHNOLOGY:	Technology related to: 1) reaction propulsion: propulsion system in which a forward motion or thrust is produced by the expulsion of propellant gases through nozzles or venturi, generally longitudinally opposed to the intended line of travel; 2) jet propulsion: reaction propulsion in which the propulsion unit obtains oxygen from the air as distinguished from rocket propulsion in which the unit carries its own oxygen producing material. In connection with aircraft propulsion, the term refers to a gasline or other fuel turbine jet unit which discharges hot gases through a tailpipe and a nozzle, affording a thrust which propels the aircraft.
PROTOCOL:	The SALT II agreement consists of three parts: a Treaty which will last through 1985, a Protocol which will last through 1981, and a Joint Statement of Principles and Basic Guidance for Subsequent

	Negotiations on the Limitation of Strategic Arms. The Protocol establishes temporary limitations on mobile ICBM launchers, ground and sea -launched cruise missiles, and ASBM's.
QUALITATIVE LIMITATION:	Restrictions on capabilities of a weapon system as distinct from quantitative limits (e.g., on numbers of strategic delivery vehicles). In SALT II, such qualitative limits include, inter alia, a prohibition on more than one new type of ICBM for each side, restrictions on missile launch-weight and throw-weight, and limitations on the number of reentry vehicles a missile may carry.
QUANTITATIVE LIMITATION:	Numerical limits on the number of weapons systems in certain categories, as distinct from qualitative limits on weapons capabilities. For the purposes of SALT II, such limitations include the various aggregate limits.
RADAR:	Radio Detection And Ranging equipment that determines the distance and usually the direction of objects by transmission and return of electromagnetic energy.
RADIAC:	A term used to designate various types of radiological measuring instruments or equipment. This term is derived from the words Radioactivity Detection, Indication And Computation and is normally used as an adjective.
RADIATION DOSE:	The total amount of ionizing radiation absorbed by material or tissues, commonly expressed in rads.
RADIUS OF ACTION:	The maximum distance a ship, aircraft or vehicle can travel away from its base along a given course with normal combat load and return without refueling allowing for all safety and operating factors.
RAMJET	A jet propulsion engine containing neither compression nor turbine, which depends for it operation on the air compression accomplished by the forward motion of the engine.
RANGE:	1. The distance between any given point and an object or target. 2. Extent or distance limiting the operation or action of something, such as the range of an aircraft, ship or gun. 3. The distance which can be covered over a hard surface by a ground vehicle, with its rated payload, using the fuel in its tank and in cans normally carried as part of the ground vehicle equipment. 4. Area equipped for pratice in shooting at targets.
RAPID RELOAD CAPABILITY:	The capability of a launcher to fire a second missile within a short period of time after an initial missile firing.

REACTION TIME	1. The elapsed time between the initiation of an action and the required response. 2. The time required between the receipt of an order directing an operation and the arrival of the initial element of the force concerned in the designated area.
REAL-TIME	The absence of delay, except for the time required for the transmission by electromagnetic energy, between the occurrence of an event or the transmission of data, and the knowledge of the event, or reception of the data at some other location.
RECONNAISSANCE:	A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy; or to secure data concerning the meteorological, hydrographic or geographic characteristics of a particular area.
REDUCED BLAST/ ENHANCED RADIATION WEAPON (RB/ER):	A nuclear weapon designed to produce significantly more and/or higher energy output(s) of neutron, x-ray, gamma rays or a combination thereof than a normal weapon of the same total yield.
REENTRY VEHICLE (RV):	That portion of a ballistic missile which carries the nuclear warhead. It is called a reentry vehicle because it reenters the earth's atmosphere in the terminal portion of the missile trajectory.
RESIDUAL RADIATION:	Nuclear radiation caused by fallout, radioactive material dispersed artificially, or irradiation which results from a nuclear explosion and persists longer than one minute after burst.
ROCKET LAUNCHER:	Device such as a barrel, tube, rail or platform from which rockets and projected.
ROENTGEN:	A unit of exposure dose of gamma (or X-) radiation.
SAFEGUARD:	A ballistic missile defense primarily designed to protect our land-based retaliatory forces against direct attack, defend the American people against a nuclear attack, and protect the United States against a possible accidental launch or small attack. The principal subsystems are the Sprint and Spartan missiles, Missile Site Radar, Perimeter Acquisition Radar, and the Data Processing System.
SEA CONTROL OPERATIONS:	The employment of naval forces, supported by land and air forces, as appropriate, to achieve military objectives in vital sea areas. Such operations include destruction of enemy naval forces, suppression of

	enemy sea commerce, protection of vital sea lanes, and establishment of local military superiority in areas of naval operations.
SECOND-STRIKE:	The first counter blow of a war. Generally associat with nuclear operations.
SENSOR:	A technical means to extend man's natural senses; equipment which detects and indicates terrain configuration, the presence of military targets, and other natural and manmade objects and activities by means of energy emitted or reflected by such targets or objects. The energy may be nuclear, electromagnetic, including the visible and invisible portions of the spectrum, chemical, biological, thermal, or mechanical, including sound, blast, and earth vibration.
SHOCK WAVE:	The continuously propagated pressure formed by the blast from an explosion in air by the air blast, underwater by the water blast and underground by the earth blast.
SIDE LOOKING AIRBORNE RADAR (SLAR):	An airborne radar, viewing at right angles to the axis of the presentation of terrain or moving targets.
SLANT RANGE:	1. The line of sight distance between two points not at the same elevation. 2. Distance in a straight line from the center of a burst of a weapon at the instant of detonation (zero point) to a target. 3. Distance in a straight line from a gun, point of observation, or radar set to a target, especially an air target.
SOFTWARE:	A set of computer programs, procedures, rule and possibly associated documentation concerned with the operation of a data processing system, e.g., compilers, library routines, manuals, circuit diagrams.
SONAR:	A sonic device used primarily for the detection and location of underwater objects. (This term is devived from the words "Sound Navigation And Ranging")
SSBN:	See SUBMARINE.
STANDOFF:	1. As pertains to shaped charge ammunition: the distance of spacing between the base of the liner and the target at the time of initiation. 2. The desirable characteristic of a weapon system that permits the attacking aircraft to launch an attack on the target at a safe distance, usually outside the range of counterfire.

STRATEGIC AIR WARFARE:	Air combat and supporting operations designed to effect, through the systematic application of force to a selected series of vital targets, the progressive destruction and disintegration of the enemy's warmaking capacity to a point where he no longer retains the ability or the will to wage war. Vital targets may include key manufacturing systems, sources of raw materials, critical material, stockpiles, power systems, transportation systems, communication facilities, concentrations of uncommitted elements of enemy armed forces, key agricultural areas, and other such target systems.
STRATEGIC INTELLIGENCE:	Intelligence which is required for the formation of policy and military plans at national and international levels.
STRATEGIC STABILITY:	The maintenance as far as possible of conditions such that neither the US nor the USSR would feel compelled to use its nuclear forces. (See ARMS STABILITY).
STRATEGIC WARNING:	A notification that enemy-initiated hostilities may be imminent. This notification may be received from minutes to hours to days or longer, prior to the initiation of hostilities.
STRATEGY:	The art and science of developing and using political economic, psychological and military forces as necessary during peace and war, to afford the maximum support to policies, in order to increase the probabilities and favorable consequences of victory and to lessen the chances of defeat.
SUB-KILOTON WEAPON:	A nuclear weapon producing a yield below one kiloton.
SUBMARINE (SSBN; SSB; SSN; SS; SSG; SSGN):	A warship designed for operations under the surface of the seas. Nuclear powered submarines contain the letter designation "N." USS nuclear-powered submarines which carry SLBMs are designated "SSBN." The US has 41 operational SSBNs with 16 launch tubes each; the TRIDENT SSBns will have 24 tubes. Soviet SSBNs include the H, Y, and D classes. Attack submarines, designated for launching cruise missiles are designated "SSGN" or "SSG" and include the Soviet S, W, F & C class submarines The Soviet long-range, diesel-powered ballistic missile submarines (Golf-class) are designated SSB.
SURFACE-TO-AIR MISSILE (SAM):	A surface-launched missile designed to operate against a target above the surface.
SURFACE-TO-SURFACE MISSILE (SSM):	A surface-launched missile designed to operate a target on the surface.

SURVEILLANCE:	The systematic observation of aerospace, surface or subsurface areas, places, persons or things by visual, aural, electronic, photographic or other means.
TACTICAL:	Pertaining to the employment of units in combat or weapons designed for combat use.
TACTICAL NUCLEAR (FORCES, WEAPONS):	The use of nuclear weapons by land, sea or air forces against opposing forces, supporting installations or facilities, in support of operations, which contribute to the accomplishment of a military mission of limited scope, or in support of the military commander's scheme of maneuver, usually limited to the area of military operations.
TARGET ACQUISITION:	1. The detection, identification and location of a target in sufficient detail to permit the effective employment of weapons. 2. Process of positioning tracking apparatus of a weapon system so that a designated target is tracked.
TARGET DESIGNATION SYSTEM:	System for transmitting to one instrument the position of a target which has been located by another instrument.
TELEMETRY:	Refers to data, transmitted by radio to the personnel conducting a weapons test, which monitor the functions and performance during the course of the test.
TERMINAL GUIDANCE:	The guidance applied to a missile between mid-course guidance and its arrival in the vicinity of the target.
THEATER:	The geographical area outside the continental United States for which a commander of a unified or specified command has been assigned military responsibility.
THERMONUCLEAR WEAPON:	A weapon in which very high temperatures are used to bring about the fusion of light nuclear such as those of hydrogen isotopes (e.g., deuterium and tritium) with the accompanying release of energy. The high temperatures required are obtained by means of an atomic (fussion) explosion.
THROW-WEIGHT:	Ballistic missile throw-weight is the useful weight which is placed on a trajectory toward the target by the boost or main propulsion stages of the missile. For the purposes of SALT II, throw-weight is defined as the sum of the weight of: . the RV or RV's; . any PBV or similar device for releasing or targeting one or more RV's; and . Any antiballistic missile penetration aids, including aids, including their release devices.

TIME-OF-FLIGHT:	The time in seconds from the instant a projectile leaves the muzzle of a weapon or a missile leaves its platform, to the instant it strikes or bursts.
TRANSPONDER:	A transmitter-receiver capable of accepting the electronic challenge of an interrogator and automatically transmitting an appropriate reply.
TURBOJET ENGINE:	A jet engine whose air is supplied by a turbine driven compressor, the turbine being activated by exhaust gases.
UNACCEPTABLE DAMAGE:	Degrees of destruction anticipated from an enemy second strike, which is sufficient to deter a nuclear power from launching a first strike. The degree of damage which will deter a first strike is a function, in part, of national value preferences and economic considerations and is therefore difficult or impossible to predict.
VERIFICATION:	The process of determining, to the extent necessary to adequately safeguard national security, that the other side is complying with an agreement. This process of judging adequacy takes into account the monitoring capabilities of existing and future intelligence collection systems and analysis techniques and the ability of the other side to evade detection if it should attempt to do so. This process also assesses the political and military significance of potential violations and the costs, risks, and gains to a side of cheating.
VULNERABILITY:	1. The susceptibility of a nation or military force to any action by any means through which its war potential or combat effectiveness may be reduced or its will to fight diminished. 2. The characteristics of a system which causes it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of effects in unnatural (manmade) hostile environment.
WARHEAD:	The part of a missile, projectile, torpedo, rocket, or other munition which contains either the nuclear or the thermonuclear system, high explosive system, chemical or biological agents or inert materials intended to inflict damage.
WAR RESERVES	War reserves are stocks of material amassed in peacetime to meet the increase in military requirements consequent upon an outbreak of war. War reserves are intended to provide the interim suport essential to sustain operations until resupply can be effected.
WEAPON SYSTEMS:	A weapon and those components required for its operation. (The term is not precise unless specific parameters are established).
YIELD:	The energy released in an explosion. The energy released in the detonation of a nuclear weapon is generally measured in terms of the kilotons (KT) or megatons (MT) of TNT required to produce the same energy release.

ACRONYMS

AAW	Anti-Air Warfare
ABM	Anti-Ballistic Missile
ABRES	Advanced Ballistic Reentry Systems
ABRV	Advanced Ballistic Re-entry Vehicle
ACR	Acoustic-Research Center
ADCU	Alternative Detection and Control Unit
ADSP	Advanced Digital Signal Process
AFAP	Artillery-Fired Atomic Projectile
AFSATCOM	Air Force Satellite Communications
AIR	Acoustic Intercept Receiver
AIRS	Advanced Inertial Reference Sphere
AIS	Advanced Isotope Separation
ALBM	Air Launched Ballistic Missile
ALCM	Air-Launched Cruise Missile
ALCS	Airborne Launch Control System
ALL	Airborne Laser Laboratory
ALPS	Alternate Launch Point System
AMaRV	Advanced Maneuvering Re-entry Vehicle
AMP	Aircraft Modernization Program
ANMCC	Alternate National Military Command Center
AP	Armour Piercing
APC	Armored Personnel Carrier
ARC	Acoustic Research Center
ARMS	Anti-Radiation Missions
ASALM	Advanced Strategic Air-Launched Missile
ASAT	Anti-Satellite
ASBM	Air-to-Surface Ballistic Missile
ASW	Anti-Submarine Warfare
ATA	Advanced Test Accelerator
ATBM	Anti-Tactical Ballistic Missile
ATGM	Anti-Tank Guided Munition
ATP	Advanced Technology Program
AWACS	Airborne Warning and Control System
BDA	Bomb Damage Assessment
BMD	Ballistic Missile Defense
BMEWS	Ballistic Missile Early Warning System
BR/CW	Biological Research/Chemical Warfare
BTH	Beyond-the-Horizon
BWC	Biological Weapons Convention
CAAM	Conventional Airfield Attack Missile
C/B/D	Chemical/Biological/Defense
C/BDT	Chemical/Biological Defense Technology
C^3 or CCC	Command, Control, and Communication
C^3I or CCCI	Command, Control, Communications and Intelligence
CD	Conference on Disarmament
CEP	Circular Error Probable
CL	Chemical-Laser
CLGP	Cannon-Launched Guided Projectile
CMCA	Cruise Missile Carrier Aircraft
CMP	Counter Military Potential

CONUS	Continental United States
CSCE	Conference on Security and Cooperation in Europe
CSEDS	Combat Systems Engineering Development Site
CTB	Comprehensive Test Ban
CW	Chemical Warfare
CY	Calender Year
DARCOM	Development and Readiness Command
DARPA	Defense Advanced Research Projects Agency
DB	Decibels
DCT	Detection/Classification/Targeting
DCU	Detection Control Unit
DF	Deuterium Flouride
DOD	Department of Defense
DOE	Department of Energy
DPG	Dugway Proving Ground
DRE	Display Remoting Equipment
DSARC	Defense Systems Acquisition Review Council
DSPK	Double Shot Probability of Kill
DU	Depleted Uranium
ECCM	Electronic Counter-Counter Measure
ECM	Electronic Counter Measure
EDL	Electric Discharge Laser
ELF	Extremely Low Frequency
ELING	Electronic Intelligence
EMCON	Emission Control
EMP	Electro-Magnetic Pulse
EMT	Equivalent Megatmorage
EP	Earth Penetrator
ERAM	Extended Range Anti Armor Mine
EUR	US European Command
FBM/IAP	Fleet Ballistic Missile/Improved Accuracy Program
FBMS	Fleet Ballistic Missile System
FBS	Forward Based Systems
FEBA	Forward Edge of the Battle Area
FLIR	Forward Looking Infrared
FMS	Foreign Military Sales
FOBS	Fractional Orbital Bombardment System
FRG	Federal Republic of Germany
FROD	Functionally Related Observable Difference
FROG	Free Rocket Over Ground
FUFO	Full Fuzing Option
FY	Fiscal Year
GDL	Gas Dynamic Laser
GEODSS	Ground-based Electro-Optical Deep Space Surveillance
GIN	Greenland, Iceland, Norway
GIUK	Greenland, Iceland, United Kingdom
GLCM	Ground-Launched Cruise Missile
GPS	Global Positioning System
GSRS	General Support Rocket System

HE	High Explosive
HEL	High Energy lasers
HELTADS	High Energy Laser Tactical Air Defense
HELWS	High Energy Laser Weapon System
HEU	High Enriched Uranium
HF	Hydro-Fluoride
HOB	Height Of Burst
HOE	Homing Overlay Experiment

IAEA	International Atomic Energy Agency
IAP	Improved Accuracy Program
ICBM	Intercontinental Ballistic Missile
IFF	Identification Friend or Foe
IHE	Insensitive High Explosives
IOC	Initial Operational Capability
IONDS	Integrated Operational Nuclear Detection System
IR	Infrared
IRBM	Intermediate Range Ballistic Missile
IRT	Intermediate Range Technology
ITV	Instrumented Test Vehicle
IVA	Intermediate Volatility Agent

JDT	Joint Draft Text
JSS	Joint Surveillance System
JTIDS	Joint Tactical Information Distribution System

KM	Kilometer
KT	Kiloton

LADARS	Laser Radars
LANT	Atlantic Command
LoAD	Low Altitude Defense
LOW/LUA	Launch on Warning/Launch Under Attack
LRTNF	Long Range Theater Nuclear Forces
LWIR	Long Wave Infrared

MAD	Mutual Assured Destruction
MAPS	Multiple Aim Point System
MaRV	Maneuvering Re-entry Vehicle
MBFR	Mutual and Balanced Force Reductions
MBT	Main Battle Tank
MCCS	Multiple Code Coded Switch
MECs	Main Evaluation Centers
MEV	Million Electron Volts
MHV	Miniature Homing Vehicle
MIRACL	Mid-Infrared Advanced Chemical Laser
MIRV	Multiple Independently Targeted Re-entry Vehicle
MLIS	Molecular Laser Isotope Separation
MOU	Memorandum Of Understanding
MPS	Multiple Protective Shelter
MRASM	Medium-Range Air-to-Surface Missile
MRBM	Medium Range Ballistic Missile
MRV	Multiple Re-entry Vehicle
MSC	Military Sealift Command

MSOR	Maximum System Operational Range
MSR	Missile Site Radar
MTU	Mobile Test Unit
MX	Missile Experimental
NATO	North Atlantic Treaty Organization
NAVFACS	Naval Shore Facilities
NAVSTAR	Navigation Satellite Timing and Ranging
NCA	National Command Authority
NDS	Navigation Development Satellite
NGA	NATO Guidelines Area
NM	Nautical Mile
NMCC	National Military Command Center
NNK	Non-Nuclear Kill
NORAD	North American Air Defense
NPT	Non-Proliferation Treaty
NSWP	Non-Soviet Warsaw Pact
NTM	National Technical Means
NTS	Navigation Technology Satellite
NUDETS	US Nuclear Detonation Warning System
OAS	Offensive Avionics System
OD	Observable Difference
OSD	Office of the Secretary of Defense
OTH	Over-The-Horizon
OTH-B	Over-The-Horizon Backscatter
OTH-T	Over-The-Horizon Targeting
PAC	Pacific Command
PAL	Permissive Action Link
PAR	Perimeter Acquisition Radar
PB	Particle Beam
PBV	Post Boost Vehicle
PBW	Particle Beam Weapon
PGM	Precision Guided Munitions
PGRV	Precision Guided Re-entry Vehicle
PI/DE	Positive Identification/Discrimination Equipment
PLSS	Precision Location Strike System
PNE	Peaceful Nuclear Explosion
POL	Petroleum, Oil, Lubrication
PSI	Pounds Per Square Inch
PSP	Plasma Separation Process
RADPG	Radar Area Coorelation Guidance
RAM	Radar Absorbing Material
RB/ER	Reduced Blast/Enhanced Radiation
RDT&E	Research, Development, Test, and Evaluation
REM	Rontgen Equivalent Man
RF	Radio Frequency
RPV	Remotely Piloted Vehicle
RV	Re-entry Vehicle
SAC	Strategic Air Command
SALT	Strategic Arms Limitation Treaty
SAM	Surface-to-Air Missile
SATCOM	Satellite Communications

SATRACK	Satellite Missile Tracking System
SAWS	Submarine Acoustic Warfare Systems Project
SCC	Special Consultative Committee
SCUD	Soviet Tactical Missile
SE/AA	Strategic Warning and Attack Systems
SF	Standard Fission
SIGINT	Signal Intelligence
SINS	Ships Inertial Navigation System
SLBM	Submarine Launched Ballistic Missile
SLCM	Sea-Launched Cruise Missile
SLFCS	Survivable Low Frequency Communication System
SLOC	Sea Lines of Communication
SLTDP	Special Laser Technology Development Program
SNDV	Strategic Nuclear Delivery Vehicle
SNM	Special Nuclear Materials
SOSUS	Sound Surveillance System
SOTAS	Stand-Off Target Acquisition System
SPA	SOSUS Probability Area
SRAM	Short-Range Attack Missile
SRAT	Short-Range Applied Technology Program
SRBM	Short-Range Ballistic Missile
SSBN	Submarine Ballistic Nuclear
SSN	Nuclear-Powered Attack Submarine
SSPK	Single Shot Probability of Kill
STP	Systems Technology Program
SURTASS	Surface Towed Array Sensor System
TACAMO	Take Charge and Move Out
TAK	Navy Cargo Ship
TASM	TOMAHAWK Anti-Ship Missile
TEL	Transporter-Erector-Launcher
TERCOM	Terrain Contour Matching
TLAM/C	TOMAHAWK Land-Attack Missile/Conventional
TLAM/N	TOMAHAWK Land-Attack Missile/Nuclear
TNF	Theater Nuclear Forces
TNW	Theater Nuclear War
TREE	Transient Radiation Effects on Electronics
TTBT	Threshold Test Ban Treaty
UE	Unit Equipped
USAF	Unied States Air Force
USG	United States Government
VLF	Very Low Frequency
V/STOL	Vertical/Short Takeoff and Landing
WAAM	Wide Area Antiarmor Munition
WIC	Warning Information Correlation
WP	Warsaw Pact
WWMCCS	Worldwide Military Command and Control System